

**POLICY AND PREVENTION: AN ANALYSIS OF THE EFFECTIVENESS OF
CONTINGENCY-BASED INTERVENTION ON THE ADOPTION OF CANCER
SCREENING BEHAVIOR**

by

Yvonne Marie Saadi

Bachelor of Philosophy, University of Pittsburgh, 2009

Submitted to the Graduate Faculty of
the University of Pittsburgh in partial fulfillment
of the requirements for the degree of
Bachelor of Philosophy

University of Pittsburgh

2009

UNIVERSITY OF PITTSBURGH
COLLEGE OF ARTS AND SCIENCES

This thesis was presented

by

Yvonne Saadi

It was defended on

April 13, 2009

and approved by

Dr. Martin Greenberg, Professor, Department of Psychology

Dr. Sabine von Dirke, Associate Professor, Department of Germanic Languages and

Literatures

Dr. Peter Harris, Reader in Social and Health Psychology, Department of Psychology at the

University of Sheffield

Dr. William Klein, Associate Professor, Department of Psychology

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Yvonne Saadi, B.A./B.S.

University of Pittsburgh, 2009

As a means of promoting preventive health behavior, incentives are becoming increasingly commonplace in healthcare and public policy. Yet relatively little research has been done on the different types of incentives (incentive, disincentive, and efficacy) or the means by which they can be used effectively in interventions to promote cancer screening. To examine these issues, a progression of four studies was designed. In the first experiment, undergraduate participants ($N = 300$) were given questionnaires to determine the general effects of incentives based on hypotheses drawn from several related literatures in psychology. Incentive-based health messages regarding skin cancer were varied by the type of incentive, message frame (gain/loss) and target behavior (sunscreen use/skin cancer screening exam). Though no main effects were observed with respect to message frame or behavior, incentives were found to better promote both intentions to receive skin cancer screening as well as anticipated contentment regarding one's ability to successfully engage in health behaviors than disincentives. Due to these findings, this study of incentives was simplified and expanded to relevant populations for colorectal cancer screening in two studies. Participants ($N = 8$ and $N = 23$) were given questionnaires designed to provide further insight on incentives—specifically, to assess the monetary amounts at which incentive messages would motivate them to undergo screening. Both incentives and disincentives were persuasive at fairly low monetary amounts, with no significant differences

observed between the means of these constructs. Trends observed in the results of the two studies suggested that disincentives may more effectively promote screening than incentives among an older population. Given these contradictory findings, a final archival study was conducted to assess trends in screening cross-culturally as a function of the use of incentives in extant governmental interventions. Cross-cultural comparison revealed that countries with efficacy-based screening programs had significantly higher screening rates than those without such programs. With few comparative analyses on incentives currently in the literature, these studies were collectively aimed at complementing current understanding about incentives in the field of psychology and, by extension, about the effectiveness of the various incentive-based interventions that governments have been adopting in recent years.

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PREFACE

To my committee, Dr. Greenberg, Dr. Harris, Dr. von Dirke, and especially to my faculty advisor Dr. Klein, I would like to thank you all very much for all of your support, insight, and guidance through this process and contributing to my Bachelor of Philosophy defense.

Additionally, I would like to thank my family and friends. This work would not have been possible without their unrelenting encouragement.

1.0 INTRODUCTION

With the remarkable advances in medicine in recent years, preventive healthcare has been increasingly promoted as a critical tool for reducing incidence and mortality of many public health concerns, such as cancer. Underuse of many healthcare behaviors, from colorectal cancer screening to sunscreen use, however, has been observed among many target populations (Centers for Disease Control and Prevention [CDC], 2006c). For example, in developed countries, including the United States and Western Europe, colorectal cancer is the second leading cause of cancer-related death, and, in the US alone, it was projected to cause approximately 49,960 deaths in 2008 (American Cancer Society [ACS], 2006d). Paradoxically, incidence and mortality of colorectal cancer tends to be highest in developed countries, which have some of the best healthcare systems and medical technology in the world, yet it is one of the most preventable cancers, as “more than 50% of all colon cancers can be prevented through lifestyle changes and widespread screening” (Colditz et al., 2005). Since screening detects and removes precancerous polyps, undergoing preventive screening for colorectal cancer reduces any individual’s risk for the disease by the greatest percentage—33% or more—, which is more than any single lifestyle change (Colditz et al., 2005).

Despite this, however, many healthcare consumers of all ages do not utilize preventive medicine as directed. In fact, among those who are recommended to undergo screening for colorectal cancer—individuals at high risk for the disease and everyone over 50 years of age—

screening rates in Germany (Altenhofen, 2006) remain below 50%, as did screening rates in England (Rhodes, 2000) until recently. In the US, screening rates in general have risen slowly, but are only in the 50-60% range for most states (Centers for Disease Control and Prevention [CDC], 2006c). Among younger populations, according to the most recent data from the Health Information National Trends Survey conducted by the National Cancer Institute, more than half of Americans age 18 and older report an underuse of sunscreen and approximately 49% report using sunscreen only “rarely” or “never” (HINTS, 2005).

Healthcare plans and governments in these countries have begun to react to the underuse of preventive care by incorporating incentives into interventions and public policy in the form of screening programs, with the hope of increasing the utilization of preventive medicine (National Conference of State Legislatures, 2007; Pallarito, 2005; National Health Service, 2003; 2006; Schmiegel, 2007; Tuffs, 2006). In 2003, the European Council approved a Commission recommendation that colorectal cancer screening—specifically programs encouraging screening through the use of fecal occult blood tests for individuals between the ages of 50-74—should be encouraged for all member states of the EU (Council of the European Union, 2003). Currently, there is growing pressure for a massive effort by the European Commission to promote the implementation of national screening programs throughout all of its member states in the action plan “Europe against Colorectal Cancer” (International Digestive Cancer Alliance, Netzwerk gegen Darmkrebs, & Felix Burda Foundation, 2007; European Commission, 2007a).

As countries in both the EU and across the world begin to institute such screening programs, the effectiveness of types of incentives as a motivational tool in medical communications for increasing uptake of preventive health behaviors, such as cancer screening and sunscreen use, has become increasingly important as an object of empirical scrutiny.

1.1 THE SCREENING TESTS

Among the available screening tests for colorectal cancer, the three for which there are national guidelines within the United States are the fecal occult blood test (FOBT), sigmoidoscopy, and colonoscopy. Fecal occult blood tests are essentially home-test-kits, for which patients place three samples of their stool on a card and then send the card to a medical laboratory, where the samples are examined for blood and other abnormalities. In contrast, sigmoidoscopies and colonoscopies are both forms of endoscopy, in which a lighted tube—or “scope”—is inserted into the rectum for visual analysis. According to the national guidelines established by the American Cancer Society—which have also been adopted in the European Union—, all individuals over 50 years of age and anyone under 50 at high risk due to family history or a personal history of polyps should undergo an FOBT annually, a sigmoidoscopy once every five years, or a colonoscopy once every ten years. The average costs of these exams range from an estimated \$7 per FOBT to \$557 per colonoscopy, with the sigmoidoscopy falling within that range at an average cost of \$174 (Campbell, Coates & Chattopadhyay, 2006).

1.2 CURRENT POLICIES

Before discussing the psychological mechanisms involved in or related to incentive message processing, three current governmental practices have been selected as case studies. These policies have been chosen for review, because they are among the most comprehensively enacted and researched of all current colorectal cancer screening policies at the federal level. Furthermore, they represent the spectrum of the types of screening programs currently being

offered by governments: a national program (UK), no program (US), and a national opportunistic program (Germany). In general, for an intervention to be considered a program, “there should be a public screening policy documented in a law, or an official regulation, decision, directive or recommendation. The policy should define, as a minimum, the screening test, the examination intervals and the group of persons eligible to be screened; and the screening examinations should be financed by public sources (apart from a possible co-payment)” (European Commission, 2007a, p. 14). Though there is some discrepancy in the literature regarding the difference between national and national opportunistic programs, for the purposes of these analyses, they will be delineated by the fact that, for a national opportunistic program, screening is offered and screening facilities are monitored by the government; however, individuals are responsible for requesting the tests themselves (Kanavos, Schurer, Owusu-Apenten & Sullivan, 2008). In contrast, national programs typically involve formal invitations sent to a target population (European Commission, 2007a). Most importantly, these three countries have been selected because they will be shown to collectively provide a comprehensive depiction of incentives, in that each exemplifies one of the three different types (efficacy, incentives, and disincentives).

1.2.1 United Kingdom

Perhaps the most intuitive and predictable governmental intervention is one in which the government directly intervenes in public policy on a national scale to catalyze the change it is advocating. With the gradual implementation of its “National Screening Programme,” the British government exemplifies such an intervention. The program, itself, is twofold. First, the government—more specifically, its publicly funded organ, the National Health Service, which is designated for developing and implementing healthcare policy—provides the target population

with FOBT kits and directions about how to complete and return them for analysis. In addition, the government has constructed specialized centers whose sole function is to analyze these tests. Unclear or abnormal results found by these centers are then communicated to the patient, who then either is asked to repeat the FOBT or is referred for a colonoscopy.

The implementation of this program on a national scale began in 2006 after two pilot studies conducted in 2001 and 2003 consistently demonstrated an increase in FOBT screening as a result of this type of government intervention, achieving uptake rates of approximately 60% (National Health Service, 2003) and approximately 50% (National Health Service, 2006), respectively. Especially in the second trial, the highest uptake of FOBT screening was observed in the cohort of 60-70 year-olds (National Health Service, 2006) as shown below.

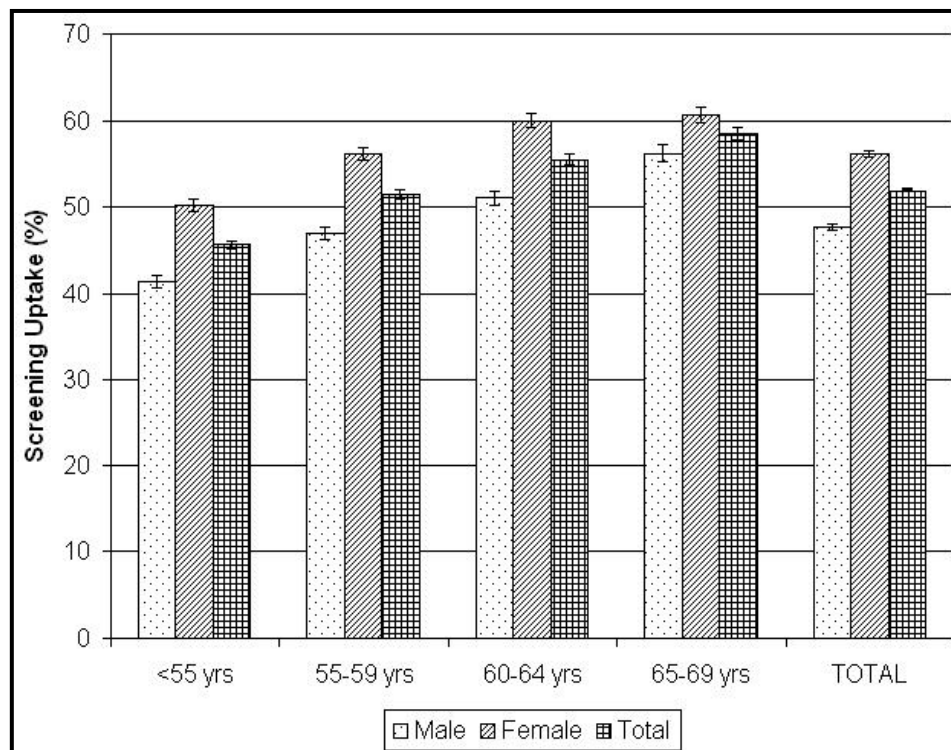


Figure 1. Estimated colorectal cancer screening uptake in the second English pilot study as a function of age and gender (National Health Service, 2006)

Prior to government intervention, screening rates in Great Britain had been estimated to be about 45% (Rhodes, 2000). Thus, based on the results obtained from the pilot studies, providing FOBT's to the at-risk population successfully increased the national screening average by a minimum of five percent. Yet both pilots targeted the same individuals with the intent of monitoring not only the adoption of cancer screening behavior, but also the maintenance and continued performance of that behavior. That a ten percent decrease in participation was observed in the population between the first and second trials, therefore, suggests that there may be limitations to the effectiveness of this program in terms of its ability to foster both adoption and maintenance behavior throughout the population.

1.2.2 The United States

Whereas England has a publicly funded healthcare system, which facilitates the implementation of a nation-wide program that directly advocates screening, the healthcare system in the United States operates primarily within the private sector. Therefore, US interventions cannot as readily be federally generated, and have assumed a more indirect nature—namely, regulation of the private insurance industry. In fact, the only existing national initiative for insurance coverage of colorectal cancer screening tests is offered by Medicare, which provides its recipients with full coverage for one FOBT annually and partial coverage for one sigmoidoscopy every four years or one colonoscopy every ten years, subject to a percentage of the deductible (Centers for Disease Control and Prevention [CDC], 2006b).

With national screening rates in the United States estimated to be in the 50-60% range for most states (CDC, 2006c), state, rather than national, policies have begun to be developed and implemented since the late 1990's. These laws require coverage of preventive cancer screening

tests from insurance companies within the state. Currently, only 29 states have instituted policies requiring insurance plans to include coverage of these tests. Of those laws, several are vague and lack the necessary specificity to effectively regulate insurance coverage according to national guidelines. For example, in Texas, insurance coverage is mandated for all insurance plans, but only for individuals over 50 years old (National Conference of State Legislatures, 2007). National guidelines, however, recommend that individuals under 50 years of age who are at high risk of the disease due to family history or other risk factors such as chronic inflammatory bowel disease also receive screening. Legislation in Wyoming necessitates preventive screening coverage; but, it only applies to “nonsymptomatic” individuals under HMO’s or group plans and, moreover, fails to specify how often insurance companies must cover these tests, as it does not reference national guidelines (House Bill No. HB0026, 2001). In Alabama, Oklahoma, and Tennessee, legislation does address colorectal coverage by insurance providers; however, it only requires them to offer such coverage and does not mandate that they actually must cover these tests according to ACS guidelines (National Cancer Institute [NCI], 2005b).

Due to this variability in the adequacy of preventive screening legislation, the American Gastroenterological Association, in cooperation with several other agencies, has issued annual reports of state laws since 2004, assigning letter grades from A-D and F, based on the specificity and comprehensiveness of the laws and their adherence to national guidelines. In the most recent “Colorectal Cancer Legislation Report Card,” the laws in 22 states received “A’s,” because they adhere to national guidelines, mandate coverage under all insurance plans, and include provisions to account for future advances in preventive screening. Four states, including Texas, received B’s for adequately meeting current screening guidelines but lacking the specificity required for an “A” rating, whereas legislation in three states, including Wyoming, received C’s, because their laws fail to specify which tests and which demographics of insurance consumers

must be covered. Finally, the aforementioned states requiring only that insurance coverage is offered received D's, and the nineteen states lacking legislation received F's.

In 2006, the American Cancer Society conducted a retrospective analysis according to these classifications, comparing yearly the screening rates of eleven states that have had colorectal cancer screening legislation since 1999 and have received "A" ratings for this legislation with states that have never had legislation. For the first two years after the implementation of preventive screening laws, screening rates in both groups were found to have increased at an equal rate; however, after the laws began to take effect, an interesting difference was observed (see below). Although screening rates in both groups increased, rates within those states with insurance coverage laws increased 40% faster than screening rates in the states without such legislation (ACS, 2006c). Thus, state laws mandating insurance coverage of cancer screening was shown to be effective in facilitating the adoption of cancer screening behavior.

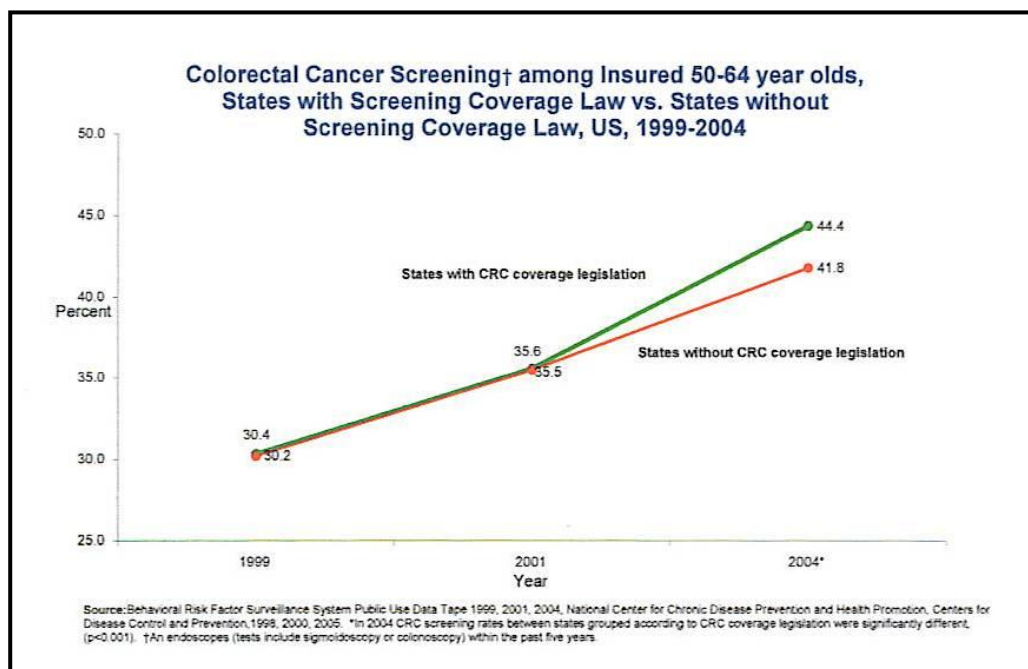


Figure 2. Colorectal cancer screening rates in the United States as a function of time in states with legislation mandating colorectal cancer screening insurance coverage versus states without such legislation

(American Cancer Society, 2006c)

One objection arising to such laws, however, is that, because insurance is largely based in the private sector in the US, many people do not have health insurance. According to the National Health Interview Survey (NHIS), though almost all Americans over the age of 65 have health insurance due to their participation in Medicare, 19% of Americans under the age of 65 lack health insurance (CDC, 2006a). Consequently, although legislation requiring insurance coverage may be effective at increasing cancer screening rates among the insured population, the uninsured one-fifth of the US population under 65 does not benefit from it. Indeed, studies have shown that having insurance is correlated with higher colorectal cancer screening rates (Codori, Petersen, Miglioretti & Boyd, 2001).

In 2000, therefore, the state of Maryland sought to address this problem by implementing a “state cancer program,” which provided the opportunity for uninsured individuals to receive free endoscopy screening. An observational study of this program among the uninsured population in one Maryland County found that screening rates increased dramatically, from 13% prior to the program to 52% after the program had taken effect (Sarfaty & Feng, 2005). As a whole, therefore, government interventions within the US, which tend to be directed at reducing financial barriers to screening, have consistently met with widespread success in recent years.

Finally, colorectal cancer screening and other preventive health behaviors are being advocated in the US not only through state action, but also within the private sector by insurance companies, themselves. Consumer Directed Healthcare—more commonly known as personalized healthcare—is the overall term encompassing a new construct for insurance plans. Offered by companies such as Humana and PacifiCare, these plans provide insurance consumers with more control in their health decision-making by offsetting high premiums—which generally are more expensive than premiums associated with regular insurance plans—with opportunities to receive benefits that are often in the form of premium reductions or lotteries.

1.2.3 Germany

Unlike England and the United States, Germany has had a national program for colorectal cancer screening in effect since 1977 in West Germany and the early 1990's in East Germany after the reunification (Schmiegel, 2006). This program offers free annual FOBT's to all residents ages 45 and older. As the use of colonoscopy became more prevalent and accepted among the medical community in Germany, yet another program was instituted. Beginning in 2002, this program stipulated that all residents between the ages of 50-54 would continue to receive free annual FOBT and would automatically become eligible for one free colonoscopy screening every ten years after age 55 (Schmiegel, 2006; Loss, Eichhorn & Nagel, 2005). Both of these programs, however, are opportunistic in structure and thus leave the pursuit of the actual tests to the individual. Since all residents are required to have insurance due to the socialized healthcare system under which the country operates, over 90% are covered by public insurance, whereas the other ten percent generally has private insurance coverage, for which those individuals had to have been given special permission by the government. As a result, not only have these programs, especially the FOBT program, been enacted far longer than most of the other cancer screening interventions currently in existence, but also the ability to participate in these programs is not restricted to any one social stratum or contingent upon having health insurance. Given these circumstances, many of the difficulties in some of the more recent government policies, such as the possible ceiling effect of the English program and the restricted applicability of many US interventions to only insured populations, seem to be addressed in the German programs. Furthermore, public awareness of both colonoscopy and FOBT is 30% higher in Germany than in the US (Loss, Eichhorn & Nagel, 2005; National Cancer Institute, 2005).

Despite these factors, German colorectal cancer screening rates are still lower than those in England and the United States. As of 2002, it was estimated that only 17% of men and less than 30% of women underwent screening (Felix Burda Stiftung, 2002). According to the German Central Institute for German Healthcare and Insurance, when stratified by age and gender, the highest screening frequency for FOBT was 35%, occurring among the 50-54 age group; however, for men, the peak screening rate was only 16% among the 65-69 age group (Altenhofen, 2006). Colonoscopy screening was even lower, with cumulative totals of 12.7% for women and only 11.2% for men between 2003-2006 (Altenhofen, 2008) (see Figure 3).

Kumulative Beteiligung der Bevölkerung an Früherkennungs-Koloskopien (2003 bis 2006 zusammengefasst)

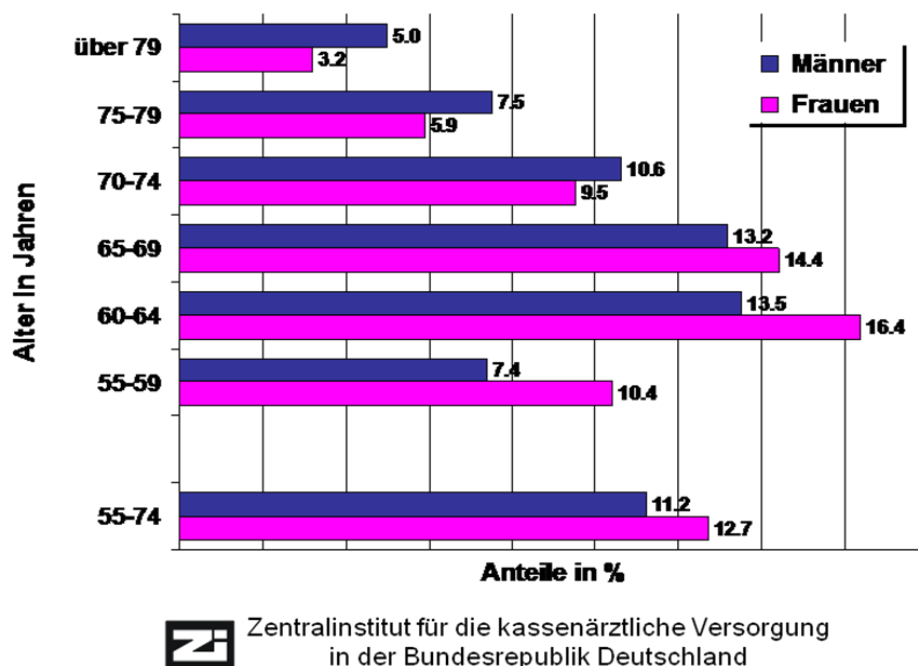


Figure 3. Colonoscopy screening rates in Germany from 2003-2006 as a function of age and gender

Thus, the German government implemented a new law in its 2007 Healthcare Reform Package. According to this law, residents of Germany who fail to undergo regular preventive cancer screening after April 1, 2007 and later develop cancer “have to contribute a maximum of two percent of their gross income towards their treatment rather than the maximum one percent

that all other patients with a chronic disease have to pay” (Tuffs, 2007, ¶ 3). While the government hopes that this new measure will increase national screening rates, public reception of this new law has been mixed; therefore, its ultimate effectiveness is uncertain.

1.2.4 Government Interventions: Some Cross-Cultural Factors

In examining these policies, it is an incontrovertible fact that many cross-cultural variables—such as the different healthcare systems and possible variation in perceived social acceptability and stigma concerning colorectal cancer screening in different cultures—may indeed be inexorably linked with the observed screening rate disparities among England, the US, and Germany. Indeed, there are differences in expectations of the healthcare system and general beliefs about the extent to which the government should be involved in regulating it. For example, *Anspruchsdenken* is the German “mentality of entitlement” toward healthcare, for which there is no counterpart in British or American culture (Cockerham, Kunz & Lueschen, 1988). This term denotes the belief among the German population, arising in virtue of their socialized healthcare system, that they have a right to demand and receive medical treatment.

Americans, in contrast, tend to prefer less government involvement in the healthcare system (Cockerham et al., 1988), but media campaigns have been successful at increasing screening uptake. In particular, Katie Couric underwent an on-air colonoscopy in March of 2000, which significantly increased subsequent screening rates in what is called the “Katie Couric effect” (Cram et al., 2003). British society, meanwhile, still has a much more defined social class structure than Germany or the US (Cockerham et al., 1988), and its often salacious tabloid press holds more influence over public opinion than in either of the other countries. Given the history of media influence in the US, this latter factor may also contribute to health beliefs in the UK.

Though there may be cultural differences, however, several studies have shown that health beliefs and behavior—at least in regard to cancer screening—do show similar cross-cultural trends, suggesting that, at least in Western society, there may be some relevant and interesting heuristics in health decision-making that remain constant across all three cultures. One cross-cultural study by Cockerham, Kunz, and Lueschen (1988) found no significant differences in everyday health behavior outside the context of the actual healthcare system, in terms of perceptions of and participation in variables such as exercise, diet, and relaxation. Furthermore, the variables of education and socioeconomic status (SES)—as operationalized in the US in terms of lack of health insurance—have been shown to moderate screening rates in both the US (ACS, 2006a; Codori, Petersen, Miglioretti & Boyd, 2001) and Germany (Heisel et al., n.d.), in that lower levels of education and SES have been consistently correlated with reduced screening rates among populations with those characteristics, as shown below.

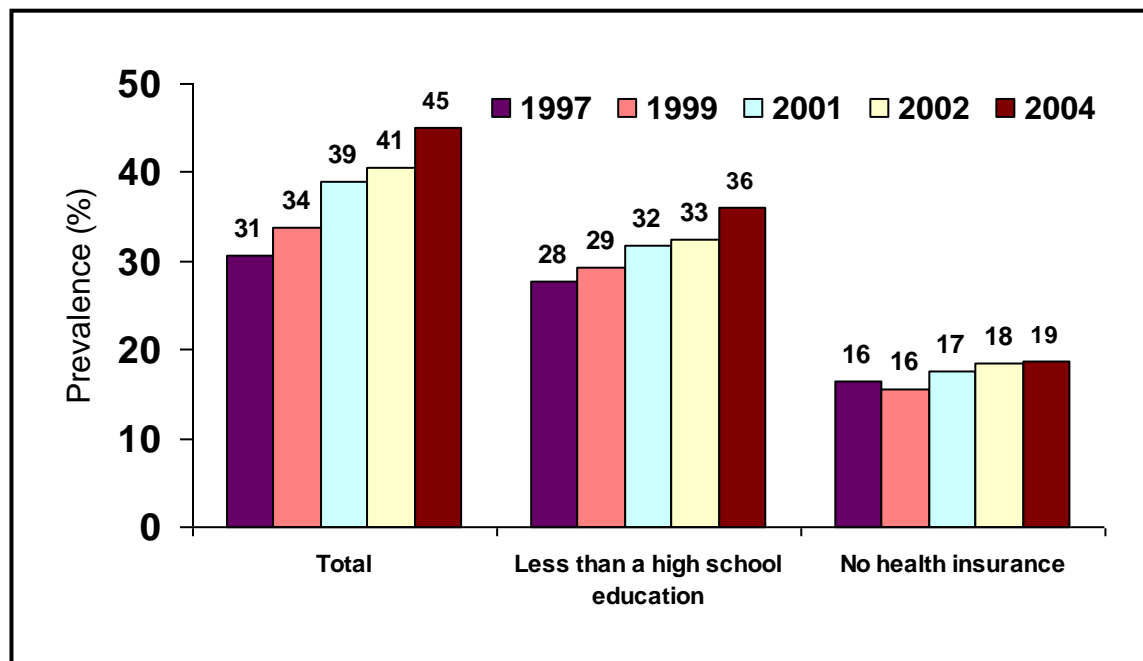


Figure 4. Colorectal cancer screening rates for sigmoidoscopy and colonoscopy among individuals 50 years and older in the United States as a function of level of education and socioeconomic status, as indicated by lack of health insurance, over time (ACS, 2006a)

2.0 LITERATURE REVIEW

Preliminary to the development of the series of experiments reported in this paper, a literature review was conducted on previous research on incentives as well as related literatures on message framing, regulatory focus, and risk perceptions.

2.1 INCENTIVES

Throughout all of the aforementioned government interventions, the unifying commonality is the use of incentives. The term “incentives” refers to the class of financial or economic factors imposed with the intent of motivating an individual to adopt or refrain from a behavior (Kane, Johnson, Town & Butler, 2004). Incentives are divisible into three main constructs, depending on the nature of the incentive and the expectation associated with it: efficacy, incentives, and disincentives. To eliminate confusion, “contingency” will henceforth be used to describe the group as a whole. Efficacy operates by enhancing perceptions of self-efficacy, which is the belief that one possesses the ability or the resources to successfully perform a desired behavior (Wood & Bandura, 1989). Enhanced self-efficacy has been correlated with increased efforts toward behavior change (Bandura & Adams, 1977) and has consistently been found to increase participation for many different health behaviors, including cancer screening (Kane et al., 2004), especially when the degree of efficacy is increased (Courtier et al., 2002). Indeed, the English

program provides efficacy by removing ambiguity concerning the acquisition and completion of the test, and state laws for compulsory insurance coverage of screening tests indirectly reduce financial barriers by requiring insurance companies to accept some of the burden of the cost.

Incentives, meanwhile, are rewards for performing a given behavior that may or may not be related in function to the behavior they are reinforcing. For instance, if a patient underwent colorectal cancer screening because he or she had been promised \$50 for doing so, the patient would be responding to an incentive. Although this incentive could be used by the patient to help defray the costs of the appointment later—which may tempt one to classify it as efficacy—this incentive inherently differs from efficacy in that it does not improve the patient’s ability to get the test. Instead, it is a reward received only after the behavior has been completed. The growing trend in the private insurance industry within the US of Consumer Directed Health Care signifies a tendency toward the use of incentives. For instance, PacifiCare insurance offers its employees personalized healthcare policies, under which they receive points for participating in healthy behaviors. With these points, they can receive incentives, either in the form of discounts on other health services or entry in lotteries for prizes, such as treadmills and iPods (Pallarito, 2005).

Disincentives promote behavior instead by threatening inaction with an unwanted outcome. In other words, if individuals fail to perform a behavior, such as cancer screening, they will lose some previously held advantage and/or gain some unwanted disadvantage. Thus, disincentives motivate individuals to alter their behavior due to their desires to avoid a given outcome. In theory, disincentives could be used to either engender the cessation of a negative behavior or reinforce a positive health behavior. Among current legislation, the new German law is an example of this construct, in that residents who fail to receive screening tests according to national guidelines must later pay twice as much on treatment as they would have if they had gotten screened. In this case, the disincentive that would be incurred if an individual fails to be

screened is the higher cost of subsequent cancer treatment, and the previously held advantage that would be lost if that individual fails to be screened is the opportunity for lower payments.

One point to note about the distinction between these three constructs is that, although included in the context of contingency, efficacy is unique because there is generally no condition that must be satisfied to get it. Individuals do not have to do anything to earn or get efficacy under interventions such as the UK screening program. Instead, they receive invitations and FOBT kits in the mail and can then choose to complete the test or ignore it. In contrast, the performance or non-performance of a target behavior determines whether an individual will receive incentives or disincentives, meaning that the reception of these rewards and punishments is contingent upon that individual's behavior. Despite this apparent incompatibility, efficacy is still included as a contingency construct due to the nature of its role in existing interventions. Just as existing programs provide incentives or disincentives to encourage target behaviors, they also promote such behaviors by providing the ability (efficacy) to perform them. Though the reception of this increased ability to perform the behavior is not necessarily dependant on previous actions, the use of efficacy is a type of provision made in many government interventions that is compatible with the goals of the use of the other contingency constructs.

An additional reason for efficacy's inclusion along the spectrum of contingency is that it can also be used contingently. In the English program, efficacy is in fact contingent in terms of the follow-up tests. Receiving a free colonoscopy as a part of the program is only possible if the FOBT kits are completed and an abnormal result is obtained. Economic barriers to receiving a colonoscopy—namely, the cost—are removed for participants, but only after they have completed the home test kit. Vouchers for bus rides to screening centers or for future tests similarly are examples of efficacy that could be used in a contingent way.

According to a review by Kane et al. (2004), “Financial incentives [contingency], if they are big enough, can influence discrete behavior at the individual level in the short run” (p. 350). This finding is fairly intuitive. Most people would not refuse to undergo even colorectal cancer screening if they were given \$500 to pay for it, were promised a \$500 reward for doing so, or were threatened with a \$500 fine for not doing so. Yet despite the long tradition of Skinnerian operant conditioning and behavioristic analyses of contingency regarding dieting and even smoking (Elder & Neef, 1986), research on its role in cancer screening is much less complete. Although many studies have shown that efficacy serves to facilitate behaviors, the research in the social psychological literature on contingency remains especially sparse regarding the effects of and comparisons between the effectiveness of incentives and disincentives in health messages. Other issues further complicate this analysis. What amount constitutes “big enough”? What role do other factors such as perceived risk or the “red tape” of the healthcare system play? And, if they do manage to encourage behavior adoption, for how long is contingency effective?

Although little is known about the roles of incentives and disincentives in the context of behavior adoption models, efficacy has been identified as an important element within several theories of behavior change that have been applied to preventive cancer screening behavior, such as the protection motivation theory (Weinstein, Rothman & Sutton, 1998), health belief model (Rawl et al., 2001; Janz, Wren, Schottenfeld & Guire, 2003), and the precaution adoption process model (PAPM) (Weinstein, 1993; Weinstein, Rothman & Sutton, 1998; Costanza et al., 2005). The PAPM in particular posits the existence of seven distinguishable stages during the adoption of a behavior: unaware; unengaged; deciding about acting; decided not to act; decided to act; acting; and maintenance. In tests of the PAPM, efficacy has been shown to play a role in the facilitating the transition from the stage in which a person has decided to act to the stage of actually performing the behavior—or “acting”—(Weinstein, Lyon, Sandman & Cuite, 1998).

2.2 MESSAGE FRAMING

Due to the lack of empirical research on the effects of contingency in health messages, insight on contingency may be gained through an examination of the related literatures on “gain” versus “loss” message framing. In general, message framing refers to the context in which a health communication is conveyed. Research on this topic has typically operationalized benefits and losses in terms of positive and negative health outcomes, respectively (Rothman, Bartels, Wlaschin & Salovey, 2006). Ostensibly, contingency seems to parallel this construct. Incentives emphasize the fiscal or economic benefits one can incur by performing a behavior, whereas disincentives direct attention to the economic losses that will be incurred if the desired behavior is not performed. This means that contingency reoperationalizes the goals used in message framing, because it shifts the goals from achieving good health or avoiding bad health—the objects of intrinsic motivation—to external, economic rewards—the object of extrinsic motivation, thereby serving as a potential bridge between two well-researched bodies of psychological literature.

According to this research, framing a health message in terms of gains or losses has consistently been shown to differentially influence subsequent behavior adoption. Specifically, gain-framed messages are more effective at promoting uptake of prevention behaviors, whereas loss-framed messages more successfully encourage detection behaviors (Rothman, Martino, Bedell, Detweiler & Salovey, 1997; Rothman, Bartels, Wlaschin & Salovey, 2006). As prospect theory explains, this is because people are risk-averse (Kahneman & Tversky, 1981). When faced with a choice of incurring losses versus receiving definite gains, people will choose the course of action from which they can receive rewards. People thus prefer health-affirming (prevention) behaviors to illness-detecting (detection) behaviors in response to messages that

emphasize gains, because the latter behaviors carry an implicit risk of uncovering a disease of which they were previously ignorant (Rothman et al., 2006). Undergoing cancer screening, for example, might uncover cancer, so individuals will not be as motivated to perform it as they would a behavior that reassures them about their health (a prevention behavior), given a choice between the two. Indeed, the majority of Americans polled believe that colorectal cancer screening is effective at detecting cancer (NCI, 2005a) and, accordingly, a detection behavior. Conversely, in situations where the choice is between a definite loss and a possible one (as in cancer screening), people tend to be risk-taking (Kahneman & Tversky, 1981), choosing the course of action in which accruing a loss is only a possibility. This is why messages emphasizing losses best encourage detection behaviors, as it is more appealing to face a possible loss by performing a detection behavior than to endure the definite loss stressed in the message.

Logically there should be no difference. If a person has a disease, this person has it whether or not he or she is aware of it. Yet people do not tend to follow this reasoning for health decisions and therefore respond differentially to message frames. Messages incorporating contingency may therefore replicate these findings, in the sense that incentives best promote prevention behaviors and disincentives most effectively promote detection behaviors. The effects of such messages may also be moderated by framing, in that incentives may be most effective at increasing behavior when framed as gain-oriented messages, whereas disincentives may be most effective at encouraging behaviors when conveyed as loss-oriented messages.

2.3 REGULATORY FOCUS

The body of research on regulatory focus may offer insight on contingency in another way. The literature on regulatory focus concerns the motivational orientation of individuals and, consequently, may provide a theoretical basis as to why the outcomes proposed in contingency serve as motivational tools to encourage participation in health behaviors. Extrapolated from the principles of hedonism, the theory of regulatory focus seeks to explain in more precise terms than just “pleasure” and “pain” why certain outcomes are more appealing than others, given an individual’s orientation toward a decision. Regulatory focus theory, therefore, makes several distinctions. Most fundamentally, it distinguishes between two goal states: the actual self, or the person one currently is, and the ideal self, or the person one wants to be.

Discrepancies between the actual and ideal selves are addressed with one of two types of regulatory focus. Promotion focus refers to an orientation toward positive outcomes and gains, such as love or respect (Higgins, 1997; Higgins, Roney, Crowe & Hymes, 1994). A promotion-focused individual seeks to move toward his or her ideal self, thereby focusing on the positive end results of his/her actions. Prevention focus, however, refers to a concern with the negative outcomes or losses, such as criticism, that could arise from a failure to perform a behavior and move an individual farther away from the ideal self (Higgins, 1997; Higgins, et al., 1994).

The theory suggests that individuals act to resolve these discrepancies (Higgins, 1997; Higgins et al., 1994; Higgins, 2000). Higgins et al. (1994) proposed that individuals choose to perform actions in two ways: either with an approach or an avoidance system. As the names indicate, the former system refers to a construct used for behaviors with desired outcomes in order for individuals to bring themselves closer to their ideal states. Meanwhile, the latter system is the response to the potential for an undesired outcome, in which an individual will avoid a

behavior if it will enhance the preexisting disparity between the ideal and actual selves. The term regulatory fit is used to describe the match between the means to achieve the desired outcome and the orientation of that individual (either promotion or prevention focus) (Higgins, 2000).

Based on this research, regulatory focus has been shown to differentially influence tendencies to adopt approach or avoidance systems (Higgins et al., 1994; Higgins, 1997; Higgins, 2000). In Higgins et al. (1994), promotion-focused individuals were found to consistently exhibit an affinity for approach systems, whereas prevention-focused individuals preferred avoidance systems. Accordingly, the regulatory fit of contingency to the orientation of the individual (promotion or prevention focus) may influence its efficacy in promoting health behaviors. In other words, if contingency is matched with strategy (incentives paired with approach systems and disincentives with avoidance systems), it should be perceived as more relevant in achieving the desired goal and thus should increase the desire to perform the behavior. For example, Shah, Higgins, and Friedman (1998) framed contingency in an anagram task in terms of gains (promotion focus) or losses (prevention focus). This task could be approached in two ways: either by manipulating the green tiles, with the possible outcome of gaining one dollar if the task was completed properly, or by focusing on the red tiles, with the possibility of avoiding the loss of a dollar if the task was completed. Results confirmed that chronic regulatory focus moderated the interaction between contingency and performance on the task. In particular, individuals who received contingency framed in a way that matched their chronic regulatory focus (promotion x promotion and prevention x prevention) tended to direct their attention more closely to the green and red tiles, respectively (Shah et al., 1998). Given these findings, the interaction between contingency and regulatory focus in health messages should mirror this pattern.

2.4 RISK PERCEPTIONS

Finally, individuals' assessments of risk have been shown to independently predict cancer screening and, in this way, may serve as a source of intrinsic motivation for preventive health behavior. In general, a higher perceived risk is associated with an increased likelihood to screen for colorectal cancer (Codori, Peterson, Miglioretti & Boyd, 2001; Codori et al., 2005). Family history has also been correlated with both a higher perceived and actual risk, as well as increased intentions to screen for a variety of cancers, including colorectal, breast, and skin cancers (Shah et al., 2007; Shah, Zhu, Palmer & Wu, 2007; Hay et al., 2005; Cameron, 2007).

The success of contingency-based interventions that appeal to extrinsic motivation may thus be influenced by individuals' preexisting risk perceptions. Indeed, if patients think they are at risk for cancer, either due to family history or due to perceived or objective risk, they may be more persuaded to screen by the threat of punishments for not doing so for the same reasons that loss-framed messages best promote detection behaviors. When individuals have a higher risk, they may be more risk-averse toward a detection behavior, such as screening. As a result, the threat of a greater loss in the form of a monetary disincentive may be a factor that is able to overcome inhibitions arising from risk-aversion and encourage the behavior anyway. Conversely, if individuals recognize few or no risk factors, they could be less likely to screen, despite any possible penalties. Among these individuals, incentives may be more effective at promoting screening behavior, because they are less likely to regard a behavior as potentially illness-detecting, even if the behavior is inherently a detection behavior, such as screening. In other words, if someone believes that he or she is at minimal risk for cancer, even cancer screening, which is aimed at detecting preexisting illnesses, will not pose as great a threat as it would for individuals with high perceived or objective risk.

Furthermore, risk perceptions for colorectal cancer tend to be overestimated (Codori et al., 2005), with many factors, including family history and personal history with related medical problems such as polyps, involved in these assessments of risk (Stark, Bertone-Johnson, Costanza & Stoddard, 2006; Codori, Petersen, Miglioretti & Boyd, 2001). Any intervention aiming to provide information about colorectal cancer and communicate accurate depictions of risk, therefore, may actually inhibit the adoption of screening behavior, as people with high perceived risk but low actual risk may view communications about their actual risk with relief and conclude that screening tests are less necessary. This may have even contributed to the 10% decline in screening uptake in the English pilot study populations between the 2001 and 2003 trials (National Health Service, 2003; 2006), in that those individuals who had completed an FOBT in 2001 thereby learned not only about their actual risk for colorectal cancer, but also that screening lowers risk. As a result, some may have failed to screen again. The effect of the interaction between perceived risk and extrinsic incentives, therefore, merits further examination.

3.0 EXPERIMENTAL INQUIRY

Due to all of these related literatures and potentially relevant variables, drawing conclusions about the effectiveness of contingency in promoting preventive health behavior is complex. On the one hand, the literature review by Kane et al. (2004) suggests that contingency is effective in the short run for promoting discrete behaviors. On the other hand, few studies in the psychological literature examine the effects of contingency in the context of health and the adoption of health behaviors, consider the influence of other variables such as framing and risk perceptions on contingency, or analyze the types of contingency in comparison with one another. Given the lack of conclusive evidence regarding contingency and the often conflicting results of the existing analyses, a progression of four studies was formulated and conducted.

In the first experiment, contingency was examined among an undergraduate population to examine several general hypotheses derived from the associated literatures. Subsequently, questionnaires for an older population were developed to assess the effects of contingency specifically on colorectal cancer screening first in a small pilot study and then in the context of a larger survey. Finally, national rates of screening behavior were compared cross-culturally to determine trends in colorectal cancer screening behavior and correlate these trends with extant national screening programs.

3.1 EXPERIMENT 1: UNDERGRADUATE SAMPLE

Using a 3 x 2 x 2 factorial design, the first experiment tested four hypotheses by varying three types of contingency-based messages (incentive, disincentive, and information-only (control)). For each contingency condition, message framing was varied in terms of gain and loss in order to determine if contingency can be mapped directly onto gain- and loss- frames or if contingency influences responses to health messages in ways that are independent of the frame of the message. Behavior type was also varied within each contingency x message frame condition. In other words, contingency messages were framed both in terms of gain and losses, and each gain and loss message was further subdivided to focus on a prevention behavior (sunscreen use) or a detection behavior (skin cancer screening). The objective for this was to determine if there is an interaction between contingency and type of behavior that may parallel, but is independent of, the established effects of message framing on behavior.

3.1.1 Hypotheses

First, [1] it was predicted that incentives framed as gain-oriented messages will be more effective at increasing intentions to do prevention behaviors than loss-framed messages about incentives. Disincentives framed as loss oriented messages were predicted to be more effective at increasing intentions to get screened. Additionally, [2] disincentives were believed to cause individuals to express greater intentions to be screened for skin cancer than to use sunscreen. Meanwhile, individuals who received incentive messages were expected to express greater intentions to use sunscreen than to receive a skin cancer screening exam. Essentially, these two hypotheses reflect the idea that the interactions between gain- and loss-framing of health messages and types of

health behaviors can be mapped onto contingency. In other words, if contingency is just a reconceptualization of message frame, in that the former focuses on more tangible fiscal rewards or punishments than the latter, it should show the same interactions with the type of health behavior as message frame. In short, incentives should best promote intentions for prevention behaviors (sunscreen use) and disincentives should engender the highest intentions to receive skin cancer screening exams. This should be the case both when incentives and disincentives are paired with gain- and loss-framed messages, respectively, and independently of message frame.

Based on the literature on regulatory focus, it was also predicted [3] that when contingency was matched with frame, participants would show higher regulatory fit. Specifically, participants were expected to associate more anticipated satisfaction with successful completion of the behavior (either sunscreen use or skin cancer screening) in response to an incentive-message and less anticipated satisfaction about failing to perform that behavior. In other words, participants who received incentive messages were expected to anticipate being happier about successfully using sunscreen or screening for skin cancer if they received incentive messages, and this would be especially true when the incentives were gain-framed. This is because gain-framed incentive messages were expected to orient individuals toward the gains they would receive by performing the behavior (thereby activating a promotion focus), which would result in a preference for performing the behavior (an approach strategy). In contrast, individuals receiving disincentive messages about a behavior (either using sunscreen or getting screened for skin cancer) would be more dissatisfied than the information-only or incentive conditions about the prospect of failing to perform the behavior, and this would be especially true when these disincentives were loss-framed. This was because loss-framed disincentive messages would emphasize the losses from not doing the behavior (thereby activating a prevention focus). Consequently, individuals in these disincentive conditions were expected to

demonstrate a preference for avoiding the loss or disincentive (an avoidance strategy), and would report higher anticipated dissatisfaction at the prospect of failing to do so.

Finally, [4] higher baseline risk perceptions for skin cancer were expected to moderate intentions to get screened in response to disincentives, such that higher risk perceptions would be correlated with higher intentions to screen. Lower risk perceptions for skin cancer, conversely, were predicted to be correlated with increased intentions to use sunscreen in response to incentives.

3.1.2 Method

3.1.2.1 Participants

The participants were male and female Introduction to Psychology students ($N = 300$) at the University of Pittsburgh. Of these participants, 65.3% were female. They received credit toward their research participation requirement.

3.1.2.2 Experimental Procedure

This experiment followed a 3 (contingency: incentive, disincentive, or control) x 2 (frame: gain or loss) x 2 (behavior type: prevention or detection) factorial design. Participants were randomly assigned to one of the twelve experimental conditions (see Table 1).

Table 1. Breakdown of Condition Composition as a Function of Incentive, Message Frame, and Behavior

Incentive x Message Frame		Type of Behavior	
		Prevention (Sunscreen)	Detection (Skin Cancer Screening)
Incentive (+\$30)	Gain	25	25
	Loss	25	25
Disincentive (-\$30)	Gain	25	25
	Loss	25	25
Information-only	Gain	25	25
	Loss	25	25

3.1.2.3 Independent Variables

The first variable manipulated was contingency, which was operationalized in three ways: incentive, disincentive, and information-only. Some participants received questionnaires describing a hypothetical incentive program that would result in reduced student health fees, whereas others received questionnaires discussing a possible disincentive program, which would result in increased student health fees (but only if the students failed to perform the behavior in question). An example of one of these messages (with the contingency manipulation in italics and alterations for the disincentive versions in brackets) is “The University of Pittsburgh is always changing the fees that students are charged. Every year, all students at the University of Pittsburgh pay a flat Student Health fee amounting to \$130. This fee is included in tuition. For next year, one possible change that the University Administration is considering is altering this policy based on students’ health behavior. One of the new considerations is the use of sunscreen.

If you use [do not use] sunscreen regularly, you can apply for and receive a \$30 reduction [be charged a \$30 increase in this fee], which would decrease your yearly tuition costs to \$100 [increase your yearly tuition costs to \$160]”. A control (information-only) condition was not exposed to contingency; instead, these messages only encouraged sunscreen or skin cancer screening as tools against skin cancer. An example is “The use of sunscreen has been shown to dramatically decrease risk for skin cancer. This is because sunscreen is the most effective way of preventing skin cancer, which is the most common cause of cancer related deaths in the US.”

Each of these three types of messages (incentive, disincentive, and control) was also varied by frame (gain or loss). An example of a gain-oriented, incentive-based message was “If you *use* sunscreen regularly, you *can* apply for and receive a \$30 reduction on this fee, which would decrease your yearly tuition costs to \$100.” In contrast, a loss-oriented, incentive-based message was “If you *do not use* sunscreen regularly, you *will not be eligible for* a \$30 reduction on this fee, which would decrease your yearly tuition costs to \$100.” In both cases, the message emphasizes an incentive, but the two messages vary on whether the person can gain the incentive by performing a behavior or lose it by failing to perform that behavior (see Appendix A).

Finally, type of behavior was varied among the types of contingency messages. In all three contingency conditions (incentive, disincentive, and information-only) half of the messages discussed contingency programs that were contingent solely upon prevention behavior (sunscreen use), while the other half of the messages focused on detection behavior (receiving skin cancer screening from a dermatologist).

These messages were embedded within a survey containing two questionnaires, and this survey was administered to participants in mass testing sessions in a large lecture room. The first questionnaire established baseline information about the participants, including current sunscreen use, skin cancer screening participation, risk perceptions of skin cancer, and perceived efficacy

of sunscreen use and skin cancer screening. Individual risk was measured by the question: “What do you think your chances are for developing skin cancer in your lifetime?” Responses were reported on a 1-7 Likert scale, from 1 = *extremely unlikely* to 7 = *extremely likely*. Perceptions of risk for skin cancer for the average individual were also assessed through one question: “What do you think are the chances of the average person of your age, sex and race developing skin cancer in his/her lifetime?” again on a 1-7 Likert scale from 1 = *extremely unlikely* to 7 = *extremely likely*. An additional measure of both individual and average risk was also included, in which individuals rated personal and aggregate chances of getting skin cancer on a scale of 0 to 100 (with 0 = *no chance* and 100 = *certain to happen*). Efficacy was assessed both pre- and post-manipulation through three items for each behavior to determine perceived ease, inconvenience, and unpleasantness in sunscreen use and skin cancer screening. Each of these items was, again assessed on a 1-7 scale, with 1 = *not at all* and 7 = *very*.

Students then received one of the twelve messages and subsequently completed the second questionnaire to measure their post-manipulation responses to the messages they had received, including items on their intentions to use sunscreen, intentions to receive receive skin cancer screening exams, perceived efficacy of these behaviors, and regulatory fit. Post-manipulation intentions were assessed through responses to a series of three statements for each sunscreen use and skin cancer screening: “I intend to use sunscreen regularly [get a skin cancer screening exam] in the next 6 months,” “How likely is it that you will TRY to use sunscreen regularly [get a skin cancer screening exam] in the next 6 months?” and “How likely is it that you WILL use sunscreen regularly [get a skin cancer screening exam] in the next 6 months?” Each participant answered all four of these questions, regardless of the behavior he or she received in the contingency-based message. Responses to each of these questions were recorded on seven-point scales: from 1 = *strongly disagree* to 7 = *strongly agree* for the first question and

from 1 = *extremely unlikely* to 7 = *extremely likely* for the other two measures. Regulatory fit was assessed post-manipulation through two measures of regulatory fit for each behavior type. These items measured the fit between the regulatory focus and the means of achieving the goal. The first was “How would you feel if you were able to successfully use sunscreen [get screened for skin cancer] in the next 6 months?” Regulatory fit was also assessed in a second question: “Imagine that you tried and failed to use sunscreen [get a skin cancer screening exam] in the next 6 months. How would you feel about this?” For these questions, responses were recorded on a scale from 1 to 19, with 1 = *very bad* and 19 = *very good* (Higgins, 2000). The higher the value of the response, the higher the fit between the focus of the person (promotion or prevention) and the means toward achieving the goal state.

3.1.3 Results

3.1.3.1 Demographic Information

Approximately half (53%) of participants classified their level of sun exposure as either somewhat or very high. Meanwhile, almost half of the participants (45%) indicated that they currently do not use sunscreen SPF 15 or higher, whereas only 36% reported regular sunscreen use. Approximately three-quarters (74%) reported that they do not see a dermatologist regularly for skin cancer screening examinations, whereas 24% do see a dermatologist regularly for any reason. Still, the majority of participants (63.3%) reported that they get sunburned “occasionally,” “rarely,” or “never.” More than half reported that they used sunless tanner/tanning lotion and tanning salons “rarely” or “never” (67% and 66%, respectively). The majority of the participants were White or Caucasian ($n = 248$), and had insurance, either on their own or through their parents ($n = 293$).

3.1.3.2 Analytic Overview

Univariate analyses based on the 3 x 2 x 2 factorial design showed no interactions among any of the target variables for intentions and regulatory fit, nor did they reveal any main effects for frame or type of behavior (prevention vs. detection). The lack of effects of contingency may have resulted from a reduction in the between-groups variance introduced by having a control group. Consequently, a set of 2 (contingency) x 2 (message frame) ANOVAs were conducted to analyze the effects of type of contingency within the two message frame conditions. Data from participants who received information-only messages were removed and used in additional univariate analyses with the fixed factors of frame and type of behavior. No significant interactions emerged from these analyses, but several significant main effects were found.

3.1.3.3 Efficacy

With Cronbach's $\alpha = .77$ and $.70$ for the three items measuring perceived efficacy of sunscreen use and skin cancer screening, respectively, (each on a scale from 1-7), responses to the efficacy questions were summed to create two variables for analysis: sunscreen efficacy and skin cancer screening, each on a new scale from 1 to 21. To examine if contingency and frame had a differential impact on perceived efficacy for sunscreen use and screening, univariate analyses were conducted with these variables, controlling for the type of the behavior in the message (so that only individuals who received a message about sunscreen use were included in analyses about sunscreen intentions and vice-versa). No interactions and almost no significant effects were found for any of the variables, even when the type of behavior in the manipulation message was matched with the behavior being examined in the analyses (sunscreen message for sunscreen efficacy analyses, screening message for screening efficacy analyses). Only when the information-only condition was excluded from the analyses did contingency have a significant

effect on perceived efficacy among those who received skin cancer screening messages ($F(1, 57) = 4.04, p < .05$), with disincentives resulting in higher perceptions of efficacy ($M = 10.72, SD = 3.87$) than incentives ($M = 9.15, SD = 3.65$).

3.1.3.4 Intentions [Hypotheses 1 and 2]

Post-manipulation items for intentions to use sunscreen or receive a skin cancer exam were highly reliable (Cronbach's $\alpha = .92$ and $.95$, respectively) and thus were collapsed into two variables by summing the responses: sunscreen intentions and skin cancer screening intentions. Univariate analyses were then conducted, again controlling for the type of the behavior in the message (so that only individuals who received a message about sunscreen use were included in analyses about sunscreen intentions, etc.). Additionally, the information-only condition was omitted for the following analyses to reduce between-groups variance that this condition may have introduced and clarify the differential effects of incentives vs. disincentives. For sunscreen intentions, no significant effects occurred across any of the incentive and disincentive conditions ($F(1, 98) = .05, p = .83$). Univariate analyses of skin cancer screening intentions, however, showed a main effect of contingency ($F(1, 98) = 5.38, p < .05$) (see Table 2) when the information-only condition was excluded from the analyses, such that incentives increased intentions to receive skin cancer screening exams ($M = 9.46, SD = 5.36$) better than disincentives ($M = 7.16, SD = 4.53$). Separate analyses were also conducted to analyze the means of the controls within these two contingency conditions, which were merely the reported intentions of individuals about their intentions to perform the behavior about which they did not receive a message. For example, if a participant received a sunscreen message, his/her responses on skin cancer screening intentions were recorded as the control for sunscreen intentions. As intended, these analyses showed no significant effects for either behavior.

Post hoc tests for contingency between all three contingency groups, including the information-only condition, again showed no significant difference in intentions for either sunscreen use or skin cancer screening, but confirmed the significance of the effects of incentives vs. disincentives in the skin cancer screening condition.

Table 2. Intentions to Receive Skin Cancer Screening as a Function of Contingency and Behavior

Contingency	Behavior Type in Message			
	Sunscreen Use (Control)		Skin Cancer Screening	
	Mean	Standard Deviation	Mean	Standard Deviation
Incentive	13.66	5.09	9.46*	5.36
Disincentive	14.26	5.21	7.16*	4.53
Information-only	15.16	4.85	7.86	4.99

(Control) denotes that the behavior in message is irrelevant to behavior target of question on intentions.

Scale for combined intentions items: 1 = *strongly disagree* [do not intend to perform behavior] to 21 = *strongly agree* [intend to perform behavior].

* Denotes a significant difference at the $p < .05$ level ($F(1, 98) = 5.38, p < .05$).

3.1.3.5 Regulatory Focus [Hypothesis 3]

Due to the nature of the experiment, participants answered both regulatory fit questions (“How would you feel if you were able to successfully use sunscreen [get screened] in the next six months?” and “Imagine that you tried and failed to use sunscreen [get a skin cancer screening exam] in the next six months. How would you feel about this?”) for both sunscreen use and skin

cancer screening, regardless of which behavior had been targeted in the message they received. As a result, half of the answers recorded by participants on regulatory focus items did not match the behavior in the message that they received. These answers served as controls. In other words, for each of the four items on regulatory fit, two questions per participant (one about successfully performing the behavior and one about failing to do so) were control measures and two actually assessed regulatory fit in relation to the behavior that had been discussed in the contingency message received during the manipulation. Individual univariate analyses were conducted for both the matched items (in which the behavior received in the message corresponded with the projected response to success or failure being assessed by the regulatory focus question) and unmatched items (in which opposite behaviors appeared in the message and regulatory focus question) for both types of regulatory focus items (see Tables 3 and 4).

Results of the successful sunscreen use regulatory fit item that was matched on behavior approached significance for contingency (including the information only condition) ($F(2, 147) = 2.80, p = .06$). After taking out the information-only condition to examine the relationship between disincentives and incentives, the relationship was significant, with incentives resulting in significantly higher reports of anticipated positive affect in regards to using sunscreen than disincentives ($F(1, 98) = 4.37, p = .04$) (see Table 3). As expected, control regulatory focus items (not matched on behavior) revealed no significant results, either when all three types of incentives (including the information-only condition) were included in the analyses ($F(2, 146) = .28, p = .76$), or when incentives and disincentives were compared alone ($F(1, 97) = .01, p = .91$). Univariate analyses for the matched questions discussing failure to use sunscreen also showed no significance for the effect of contingency when all three conditions were compared, ($F(2, 147) = 2.0, p = .15$), and even when the information-only condition was not included in the analyses ($F(1, 98) = 2.37, p = .13$). Non-matched failure to use sunscreen questions, however did

approach significance for incentives, ($F(1, 96) = 3.00, p = .09$), but not when the information-only condition was included in the analyses ($F(2, 145) = 2.03, p = .14$).

Table 3. Future Sunscreen Use Goals as a Function of Contingency and Regulatory Focus.

Contingency	Orientation			
	Perform Behavior		Fail to Perform Behavior	
	Mean	Standard Deviation	Mean	Standard Deviation
Incentive				
Sunscreen	16.18*	3.49	9.36	4.47
Screening (c)	15.86	3.25	9.25	2.78
Disincentive				
Sunscreen	14.64*	3.87	8.14	3.39
Screening (c)	15.78	3.31	8.06	3.90
Information-only				
Sunscreen	16.00	3.30	7.96	3.60
Screening (c)	16.22	2.86	7.88	4.09

(c) = control, signifying that the behavior in message irrelevant to behavior target in question.

* Denotes a significant difference at the $p < .05$ level ($F(1, 98) = 4.37, p < .05$).

Scale for regulatory fit items (Tables 3 and 4): 1 = *very bad* to 19 = *very good*.

Among the regulatory fit questions on skin cancer screening (see Table 4), responses about successful screening were significant when the behavior in the question was matched with the behavior discussed in the message, but only when comparing incentives with disincentives ($F(1, 96) = 4.64, p = .03$), and not when the information-only condition was included in the analyses ($F(2, 145) = 2.71, p = .07$). Paradoxically, the non-matched or control questions on successful screening did reach significance, both when all three contingency groups were incorporated in the analyses ($F(2, 147) = 3.51, p = .03$), and when incentives and disincentives were compared alone ($F(1, 98) = 4.59, p = .04$).

Finally, univariate analyses were conducted on matched and non-matched responses to the question concerning the failure to receive skin cancer screening. Matched responses did not demonstrate significant differences when all three contingency conditions were included in the analyses ($F(2, 145) = .22, p = .81$), or when only incentives and disincentives were compared ($F(1, 96) = .45, p = .50$). Similarly, analyses on the non-matched items did not reach significance ($F(2, 147) = .57, p = .57$), even when the information-only condition was excluded ($F(1, 98) = .41, p = .53$).

3.1.3.6 Risk Perceptions [Hypothesis 4]

Results showed that participants estimated their risk for skin cancer ($M = 4.11, SD = 1.41$) to be lower than the average person's risk ($M = 4.55, SD = 1.14$), $t(299) = 5.22, p < .0001$. An additional t-test was then conducted on the second set of measures of perceived individual and average risk (on a percentage scale). Again, perceived personal risk for skin cancer ($M = 41.01, SD = 24.44$) was lower than the perceived risk of skin cancer for the average person ($M = 47.88, SD = 21.14$) and this difference was significant ($t(299) = 5.41, p < .0001$). Although they were correlated with intentions to use sunscreen ($r(298) = .13, p < .05$) and intentions to receive skin

cancer screening ($r(298) = .24, p < .01$), perceptions of risk did not appear to co-vary with or moderate the effects of contingency when controlled for in univariate analyses. Thus, in contrast to what was hypothesized [4], type of contingency did not interact with baseline risk perceptions.

Table 4. Future Skin Cancer Screening Goals as a Function of Contingency and Regulatory Focus.

Contingency	Orientation			
	Perform Behavior		Fail to Perform Behavior	
	Mean	Standard Deviation	Mean	Standard Deviation
Incentive				
Sunscreen (c)	15.50*	3.41	8.76	3.87
Screening	15.63**	3.37	8.42	3.14
Disincentive				
Sunscreen (c)	14.08*	3.21	9.16	2.16
Screening	14.02**	3.96	8.82	2.79
Information-only				
Sunscreen (c)	15.62*	3.07	8.50	3.11
Screening	15.44	3.89	8.48	3.82

(c) = control, signifying that the behavior in message irrelevant to behavior target in question.

* Denotes a significant difference at the $p < .05$ level ($F(2, 147) = 3.51, p < .05$).

**Denotes a significant difference at the $p < .05$ level ($F(1, 96) = 4.64, p < .05$).

3.1.4 Experiment 1: Discussion

Based on these data, only a few of the initial hypotheses were supported. No interactions were found between contingency and frame or type of behavior on any of the dependent measures, including efficacy, intentions, or regulatory fit items. Type of behavior did not engender any significant effects in any condition, which is perhaps to be expected, given the fact that the only time one behavior was emphasized over another was in the short contingency-based message. For the rest of the questionnaire, participants were asked equally often about their sunscreen use as they were about their skin cancer screening, which may have rendered any mention of one behavior in the message irrelevant, especially with all of the other information in the message.

Although this study failed to link the message framing literature to contingency, several of the contingency manipulations did achieve significance. Among the group of participants that received contingency-based messages on skin cancer screening, incentives were significantly more effective at promoting subsequent intentions to undergo screening exams than disincentives. This finding was actually the opposite of what was predicted (that inherently detection behaviors would be best promoted by disincentives). Consequently, these results suggest that contingency may be more complex than just a reoperationalization of message framing. Incentives, which focus on gains, were shown to best promote a detection behavior in this experiment, whereas the research on the construct of message framing has consistently shown that messages focusing on losses most effectively promote detection behaviors (Rothman et al., 1997; Rothman et al., 2006).

That skin cancer screening, and not sunscreen use, was affected by contingency is also interesting. Primarily recommended for men and women over 40 (Shah, et al., 2007; Shah, Zhu, Palmer & Wu, 2007), skin cancer screening was unlikely to be very high for this sample. Indeed,

only about a quarter (26%) of participants reported that they regularly see a dermatologist, whereas a higher percentage (36%) reported regular sunscreen use. However, incentives were significantly more effective in promoting intentions to receive skin cancer screening, whereas none of the contingency variables had any significant impact on increasing intentions for sunscreen. Given these observations, it could be possible that contingency has differential effects on behaviors in terms of the frequency with which they are performed. Perhaps incentives are more effective at promoting new behaviors, rather than behaviors that people already perform regularly. This would explain the observed effectiveness of contingency in the short term in promoting uptake of a variety of health behaviors and the complexity of understanding of contingency over the long run (Kane et al., 2004).

The regulatory fit measures provided the most interesting results. For the item on successful sunscreen use, contingency resulted in significantly different levels of anticipated satisfaction, with incentives engendering greater predictions of happiness for successful use than disincentives. This makes sense, because incentives would add to the benefit incurred. If the healthcare program discussed in the messages in this experiment actually existed, individuals who would like to increase their sunscreen use would not only fulfill their goals, thereby approaching their ideal selves, but also receive external rewards. More significantly, the disincentive condition projected much lower levels of anticipated satisfaction with successful sunscreen use than even the information-only condition, which received no contingency.

Additionally, on the skin cancer screening items for regulatory fit, two main effects were observed, both regarding the successful completion item. Again, individuals asked how they would feel if they were able to successfully receive a skin cancer screening exam reported higher anticipated satisfaction when they received incentives than disincentives. Unlike the successful sunscreen use question, however, the effects of contingency were also significant among those

who received sunscreen messages (thereby serving as the control on behavior in this question), and this significant effect held across all three contingency conditions. Interestingly enough, although there were significant differences between the three conditions, the information-only condition produced the highest level of anticipated satisfaction, followed by incentive and disincentive, respectively. These findings do support the hypothesis that successful completion of a behavior would be more appreciated by individuals who received incentives in the health messages than by individuals facing disincentives.

A final finding to note is that, although perceived risk did not appear to co-vary with or influence the effects of contingency when controlled for in univariate analyses, t-tests on the risk measures replicated a general finding in the social psychological literature that the majority of people perceive their risk to be lower than that of the average person. This unrealistic optimism has been demonstrated for a variety of health risks, including skin cancer (Clarke, Williams, & Arthey, 1997), and diminished perceptions of the hazard inherent in risk behavior is especially low among young adults (Cohn, MacFarlane, Yanez, & Imai, 1995).

These results illuminate several directions for future studies on contingency. First, measures on perceived barriers to and attitudes toward screening should be included. Both of these items were not assessed in this study, but would be valuable in any future analyses of screening. Perceived barriers have especially been shown to influence screening behavior (Rawl et al., 2001; Janz, Wren, Schottenfeld & Guire, 2003). Because regulatory fit was the most successful dependent measure, future studies should also continue to examine regulatory focus to determine if there are any further interactions with contingency. Indeed, “One explanation, then, for incentives’ [contingency’s] inconsistent effects on performance may be their lack of congruence with participants’ goals or needs” (Shah et al., 1998, p. 285).

One possible problem with the design of this study was that no measure of family history was included in the questionnaires. This may have influenced participants' preexisting beliefs and attitudes toward skin cancer, because it has been estimated that as much as 94% of families stricken by melanoma have regular conversations about skin cancer screening (Hay et al., 2005). If family history independently influences skin cancer screening, that would have been an important variable for which to control. Another potentially important variable is participants' preexisting beliefs of self-efficacy, or their ability to prevent skin cancer. If they believed they can prevent it, they may not have been as influenced by disincentives, because the disincentives may not have been as threatening. Again, this was not incorporated in the dependent measures.

An additional limitation was that the same monetary values were used for both incentive and disincentive messages. Incentive messages may be effective at different monetary amounts than disincentives; thus, the amounts used for each construct in this study may have been higher or lower than they needed to be. In other words, the amount used in all messages (\$30) may have resulted in a more effective message of one type of contingency over another, because it may be the case that incentives are promoted at lower monetary amounts than disincentives, or vice versa. For example, disincentive messages may only be effective at amounts of \$40 or greater, whereas a \$30 reward would suffice for an effective incentive message. Indeed, this would explain why the opposite of what was predicted in the hypotheses was observed. Perhaps disincentives best promote screening, but only when the value of the disincentive is higher than the one used in this study. Further analysis of contingency should therefore first determine if incentives and disincentives promote screening at the same or at different monetary values.

Any possible interactions that do exist between the independent variables of frame, type of behavior, and contingency may have also been muddled by the nature of the messages. Because so many variables were manipulated in such a short time, there may have been an

attentional bias in favor of the most tangible aspect of the message: the monetary incentive. This would explain the polarization of the significant effects for only the contingency variable and may have obscured or obfuscated any effects of message framing or type of behavior. Future studies on contingency should therefore simplify incentive and disincentive messages. One way to do this is to vary the messages only by contingency, and not by frame or behavior type. Given that no interactions between contingency and either frame or behavior type were found in this study, these constructs should not be varied in future contingency messages, in order to eliminate attentional bias and distractions within the message.

Finally, contingency messages must be assessed among other populations to uncover differential responses to contingency among different age groups. Because skin cancer screening is officially recommended for individuals over 40 (Shah, et al., 2007; Shah, Zhu, Palmer & Wu, 2007), this student population may have found such an intervention personally irrelevant due to age, regardless of contingency. Older populations for whom cancer screening in general is more commonly recommended may respond differently to contingency messages, simply because of their recognition of the necessity to receive screening at their age.

Due to this possible irrelevance of the skin cancer screening paradigm for the sample of this study—undergraduate students—the first step in further inquiry was to assess the effects of contingency among populations for whom cancer screening is a relevant behavior.

3.2 STUDY 2: COMMUNITY SAMPLE

Because of the mixed results of the first experiment, a second questionnaire was incorporated into an ongoing study on colorectal cancer screening study—this time with the target population

for colorectal cancer screening (individuals ages 50 and older). The objective was to collect pilot data that could address some of the shortcomings of and provide answers to some of the questions that arose regarding the design of the first experiment. Specifically, in that experiment, no distinction was made between incentives and disincentives in terms of the monetary amount used in the messages. The same dollar value was used for all contingency messages. Yet the amount of the incentive at which a message is most persuasive may differ from the optimal amount for a disincentive. Consequently, these questionnaires were administered to determine if there is a difference in the amount needed for an incentive to be effective as a motivational tool and the amount needed for a disincentive to be effective. One additional hypothesis derived from the literature review regarding the relationship between risk perceptions and contingency was also examined.

3.2.1 Hypotheses

First, [1] incentives were predicted to be more effective than disincentives at promoting screening, both when the incentives were related to co-payments and when they were related to treatment costs. This was assessed through a series of four contingency scenario items. Two scenarios presented a situation in which screening would result in a reduction in monthly co-payments (incentive-screening) or in future medical costs, should the individual develop cancer (incentive-treatment). The other two scenarios presented the converse: that a failure to screen would result in an increase in monthly co-payments (disincentive-screening) or future medical costs (disincentive-treatment). For incentives to be more effective than disincentive in this context, therefore, participants would have to respond that it would take less of a decrease in payments (and thus smaller incentives) for them to want to get screened than it would take of a

potential increase in insurance costs (meaning that the disincentives selected would have to be of higher monetary amounts). This prediction was based on the success of incentives over disincentives in promoting intentions for screening behavior in the previous experiment.

Additionally, [2] participants with low perceived risk were expected to express greater desire to screen for smaller positive incentives in response to gain-framed/incentive messages, as they may view screening as more of a prevention behavior. Because cancer screening is more generally perceived as an effective detection behavior, however, disincentives, were expected to be especially moderated by risk feedback, such that participants with the highest risk would be threatened by the smallest punishments.

3.2.2 Method

3.2.2.1 Participants

Eight male and female residents of Allegheny County ($N = 8$) between the ages of 50-75 comprised this sample. Participants were recruited through the University Center for Social and Urban Research (UCSUR), a recruiting service at the University of Pittsburgh. Participants were contacted from UCSUR's call list databases and asked basic eligibility questions. Eligible participants were then referred to the Social and Health Psychology Laboratory, which is running the larger study into which the questionnaires for this study were included. Criteria for eligibility were that participants could never have undergone colorectal cancer screening and could never have had any type of cancer. This was done to ensure that the sample was representative of the target population for the legislation and programs advocating colorectal cancer screening in terms of age and lack of screening history.

3.2.2.2 Procedure

Based on the literature review, questionnaires aimed at illuminating interactions among contingency, risk perceptions, and gain-and loss-framed messages were developed (see Appendices B and C). These questionnaires were added to a larger ongoing experiment about colorectal cancer screening, which was comprised of a one hour baseline interview conducted via telephone, including measures assessing family history, awareness of screening tests, and risk perceptions (see Appendix B) and a subsequent one hour lab session, during which the participants were given personalized risk information from the Harvard Risk Index (Colditz et al., 2005). At the end of the lab session, participants in the control condition for the experiment, who therefore had not received any experimental manipulation, were presented with four hypothetical situations concerning contingency.

In order to collect data on the monetary amounts that would be effective in incentive-based vs. disincentive-based interventions, one open-ended question [1] and four hypothetical contingency scenarios were developed. Two presented screening interventions (one gain-framed and incentive-based [4], and one loss-framed and disincentive-based [2]), and two scenarios had interventions related to treatment (one gain-framed and incentive-based [5], and one loss-framed and disincentive-based [3]) (see Appendix C). Incentive-based messages were presented in gain but not loss frames and disincentives were paired exclusively with loss-frames. This was done because incentives are intuitively gain-framed, as this is how they are found in actual messages, such as in communications by consumer-directed health providers. Likewise, disincentive messages are typically loss-framed in actual communications, as in the German disincentive-based screening law. Given that no interactions were found between frame and contingency in the previous experiment, contingency messages were constructed to emulate realistic scenarios for two reasons: first, with the hope of generating results with more generalizability to current

interventions, and second, to reduce the possibility for confusion among participants. Mirroring current legislation in hypothetical questions made the questions very detailed, and further complicating the messages by varying frame in ways that are counter-intuitive and artificial was deemed superfluous for the aim of this pilot study. Especially due to the within-groups design and the fact that participants received these questionnaires after an hour-long experiment, the questions were designed to be as concise and realistic as possible.

Incentive-based scenarios were succeeded by the question: “How much of an decrease in your monthly payments would this insurance plan have to propose for you to get screened for CRC now?” whereas loss-frame/disincentive-based scenarios were followed by the question: “How much of a increase in your monthly payments would this insurance plan have to propose for you to get screened for CRC now?” Scales for both disincentive scenarios ranged from 1 = “Less than \$10 per month” to 7 = “Greater than \$100 per month.” For the incentive-based screening item, the scale also ranged from 1 = “Less than \$10 per month” to 7 = “Greater than \$100 per month.” For all three of these questions, the response “I would not get screened” was coded as 8. The scale for the gain-framed treatment item, however, ranged from 1 = “1900 co-pay per month on future cancer treatment” to 5 = “\$100 co-pay per month,” with 6 = “I would not get screened.” Incentive treatment items were constructed differently for two reasons. Although the contingency screening questions were modeled after consumer health care communications, the treatment items were designed with the intention of emulating the construct of the German legislation, in which the use of contingency concerns treatment payments. So, the idea was to develop both an incentive and disincentive version of this question. As a result, the scales had to be changed, because the difference between answer choices ranging from \$10-\$100 dollar increases or decreases on cancer treatment payments would be too marginally insignificant in proportion to the actual costs of these treatments.

Though the incentive treatment item was changed accordingly, the scale and focus used in the disincentive treatment item were kept the same as for the screening questions in the end. This was done, first, because the German construction of the disincentive message is unrealistic for US healthcare consumers. In Germany, healthcare is universal and federally controlled, which provides more room for uncontested action. Due to the privatized nature of the US healthcare system, Americans with such a policy would merely change providers. Thus, it was feared that including an item that explicitly addressed a fiscal punishment on cancer treatment would not elicit realistic responses. Increasing one's insurance payments after their liability increases is, however, a common notion in US culture—for example, if one gets into too many car accidents, one is subsequently subject to paying more to remain insured. It is even conceivable that health insurance providers, especially in the consumer directed healthcare sector, that incentivize preventive health behavior could incorporate such a disincentive construct into their plans, whereas a punishment on cancer treatment costs would be a risky business endeavor, given free market competition. Additionally, using the same scale as the screening questions for the disincentive treatment scenario allowed for potential subsequent statistical comparison within the disincentive items, in order to examine whether the focus of a contingency question, either screening or treatment upon being diagnosed with cancer, would affect responses to it. Thus, the scale and construction of the incentive treatment, but not the disincentive treatment question was altered. Finally, the order of the contingency questions was randomized according to a random number generator before the questionnaires were given to the participants, in order to counteract any possible order effects arising from the sequence in which the incentive and disincentive messages were presented.

3.2.3 Results

3.2.3.1 Demographics

This study is part of a larger experiment that is ongoing and not yet complete. Only eight participants have completed the questionnaires. Of these eight, seven identified as White, one as Black, and one declined to answer in the baseline interview. Six reported that they currently had some kind of insurance. The average age of these participants was 58.50 ($SD = 4.54$).

3.2.3.2 Contingency items

In response to the open-ended incentive question [1], in which participants were asked how much they would have to be paid to get screened in the next two weeks, responses ranged drastically, from the “cost of the test” to \$0 to \$5000 ($M = 721.88$, $SD = 1736.30$).

Means were then calculated for each contingency scenario (see Figure 5 on the next page). For the disincentive treatment item [3] the reported effective monetary amount was lower ($M = 2.25$, $SD = 2.05$) than for any of the other scenarios, whereas the incentive treatment [5] item engendered the highest mean response ($M = 3.75$, $SD = 1.91$). The incentive screening [4] scenario resulted in the second highest mean response ($M = 2.75$, $SD = 1.98$), and the disincentive screening item [2] elicited the second lowest mean response ($M = 2.62$, $SD = 2.20$).

Paired samples t-tests revealed no significant differences between the means of the responses for the disincentive screening and disincentive treatment items ($t(7) = 1.43$, $p = .20$). When responses for the incentive and disincentive screening items were compared, means again did not differ significantly ($t(7) = -.26$, $p = .80$). Because the differences between the means of the disincentive questions are in the right direction, these results may become significant with a larger sample size. If so, this would suggest that the focus of contingency (either on screening or

on treatment) may impact responses to such messages, at least for disincentives. This would make sense, given that an individual paying for cancer treatment would be more sensitive to medical costs, and would likely act more readily (to smaller monetary amounts) to avoid additional fiscal disincentives. Additionally, if the difference between the means of the incentive and disincentive screening items reached significance with a larger sample size, this would fail to support the hypothesis, as it would mean that participants expressed that they would be screened only in response to incentives of greater value (higher monetary amounts). This would, however, support the framing literature, which asserts that screening (a detection behavior) is more effectively promoted among individuals when they are faced with a loss as the alternative.

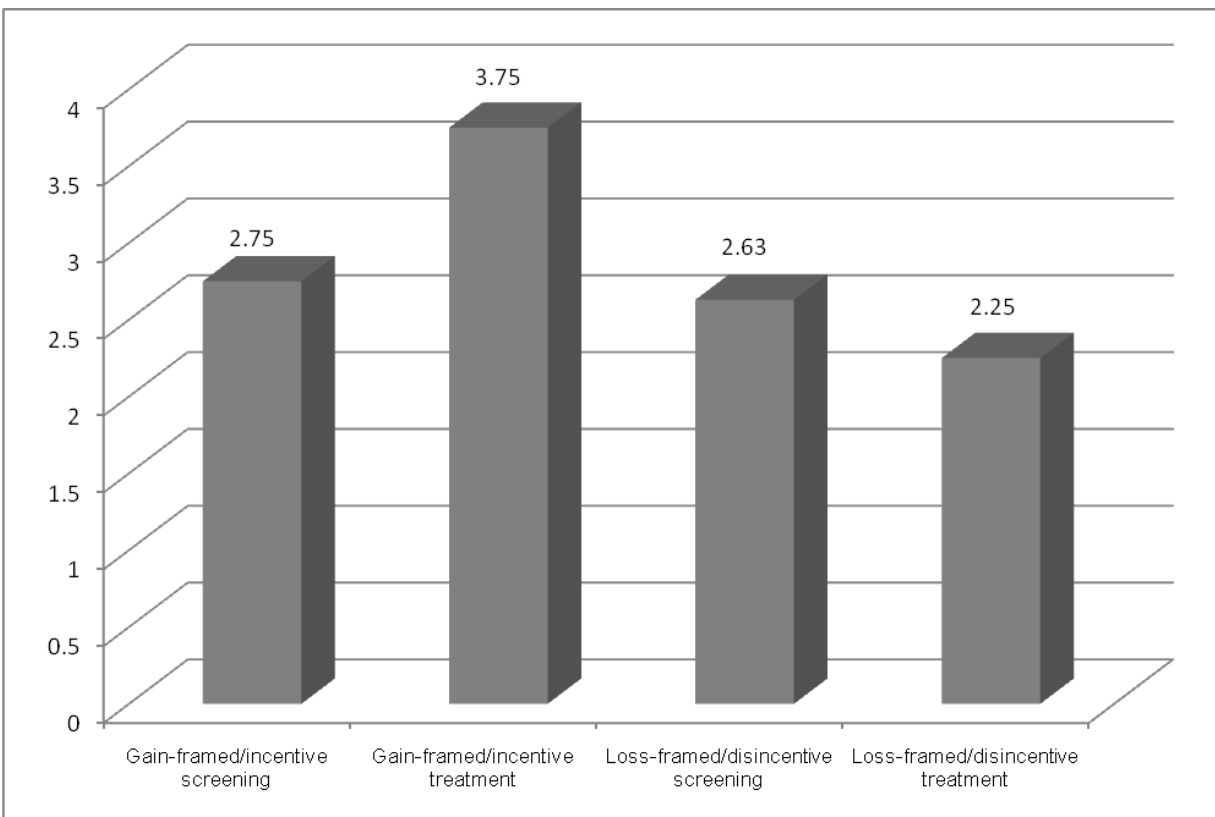


Figure 5. Mean reported monetary values for effective contingency interventions as a function of type of intervention and behavior

Z-scores were then calculated for correlational analyses of all four questions. Significant correlations were found among all of the contingency items, except for the incentive treatment

item. Disincentive screening responses were not only positively correlated with disincentive treatment responses ($r(6) = .94, p < .001$), but also with incentive screening responses ($r(6) = .80, p < .05$). Incentive screening responses were also significantly correlated with disincentive treatment responses ($r(6) = .86, p < .01$). Incentive treatment responses, however, were not significantly correlated with responses to the incentive screening ($r(6) = .47, p = .24$), disincentive screening ($r(6) = .59, p = .13$), or disincentive treatment ($r(6) = .53, p = .18$) items. That the responses to the disincentive screening, disincentive treatment, and incentive screening questions were highly significant suggests that individuals tend to respond similarly to both of these types of contingency. Additionally, the lack of a significant correlation between responses to the incentive treatment scenario and any of the other items may be suggestive of the fact that individuals respond differentially to situations in which the focus of contingency is explicitly related to cancer treatment costs, rather than overall insurance payments. Despite the lack of significance, however, correlations were high across all conditions, and may become significant even for the incentive treatment item with a larger sample size.

3.2.3.3 Risk Perceptions

Correlational analyses were then conducted to determine relationships between participants' perceived risk and their responses to the contingency scenarios. Results revealed that participants' risk perceptions were not significantly correlated with their responses to the incentive screening ($r(6) = -.20, p = .64$), incentive treatment ($r(6) = .22, p = .60$), disincentive screening ($r(6) = -.34, p = .41$), or disincentive treatment ($r(6) = -.38, p = .36$) scenarios. Though the correlations were not significant, they were still large enough to indicate trends that may become significant with more participants. Furthermore, three of the four scenarios revealed a negative relationship with perceived risk. Correlations tended more towards significance for the

treatment items than their screening counterparts, and results for both disincentive items approached significance more closely than the results for the incentive items. With a larger sample size, these analyses may reach significance, especially for the disincentive items. Such findings would support the hypothesis that the higher the risk perceptions, the lower the monetary value it would take for a disincentive to be effective, especially when cancer treatment is addressed in the message.

3.2.4 Study 2: Discussion

None of the hypotheses was supported in this pilot study. Incentives were no more likely than disincentives to encourage screening at lower amounts. In fact, responses to all contingency scenarios except for the treatment incentive item were highly related, based on the positive correlations between the responses to three of the four contingency questions. According to these correlations, individuals who selected lower amounts for the incentive questions, were just as likely to report that they would get screened in response to lower valued disincentives. This is not only contradictory to the results of the previous study among an undergraduate sample in which incentives were more likely than disincentives to promote intentions to undergo a skin cancer screening exam, but also counter to the framing literature, according to which people tend to be more sensitive to facing potential losses than accruing potential gains when presented with the option of performing detection behaviors (Rothman et al., 2006), because people are risk averse (Kahneman & Tversky, 1981). Trends toward significance, however, suggested that the latter hypothesis may receive some support if the size of the sample were increased.

Risk perceptions were also not significantly correlated with responses to the contingency items, though the beginnings of possible trends were observed. Treatment-focused items tended

toward significance more than the screening items for both incentives and disincentives. Analyses also revealed that the disincentive items as a whole approached significance more closely than either incentive item. In a larger sample, these results might reach significance and thereby provide support for the idea that disincentives more effectively promote screening (at lower monetary values) when coupled with higher risk perceptions. Finally, no conclusions could be drawn from the open-ended incentive question due to the wide range of responses.

One interesting point is that all of the scenario questions included among the answer choices the response: “I would not get screened.” Interestingly, only one participant selected this item at all, and only once: for the incentive treatment item. That all other participants selected from among the remaining answer choices is suggestive of the fact that contingency across the board would promote the adoption of cancer screening behavior, though this is merely speculative. It may be the case that individuals refuse screening more readily in response to scenarios in which the incentive may only be gained on a conditional basis—for example, if the participant developed cancer. A larger sample would be needed to confirm this hypothesis.

Some of the limitations to this pilot included most obviously the small sample size, which limits generalizability, as well as randomization problems. The small sample size of this study certainly limits the extent to which general conclusions about contingency can be drawn from the results. However, in light of the fact that this study was conducted to collect pilot data, it did fulfill its purpose in providing some results for comparison, though none of the t-tests was significant, and did reveal some interesting correlations. Secondly, although the contingency items were randomized, the majority of the questionnaires were answered in the order in which they are listed in Appendix C. This occurred because of the small number of participants coupled with the fact that some of the participants who had been assigned numbers failed to answer the contingency questionnaire. Because these questions were administered at the end of the lab

session, in a few cases, participants to whom an order for the items had been assigned expressed urgency to leave and did not complete the questionnaires. However, the significant correlations among all questions except for the incentive treatment item suggests that the order of contingency construct that participants received was unlikely to have altered their responses. Overall, the results obtained from this pilot study necessitated further inquiry and, above all, a larger data set to provide clarification for the contradictory findings.

3.3 STUDY 3: CONTINGENCY WITH COMMUNITY SAMPLE

To further examine the pilot data collected on the contingency items from the previous community sample study and to further examine the most promising finding from the first study—that of the interaction between contingency and regulatory focus—, a questionnaire was developed for use as an online survey. This questionnaire comprised items from both the first study—adapted for the colorectal cancer screening population—and items from the second (see Appendix D). From the first study, questions addressing regulatory fit and perceived efficacy for colorectal cancer screening were selected, due to the interesting results on these dimensions among the undergraduate sample. The aim was to assess whether the findings would hold in an older population. From the pilot study, the contingency items were incorporated. Additionally, questions regarding the role and effectiveness of insurance and government were included to assess attitudes about third party involvement in facilitating cancer screening.

3.3.1 Hypotheses

First, attitudes toward insurance and government regarding colorectal cancer screening and treatment were expected to be negative, because neither the federal government nor the state of Pennsylvania had any legislation related to encouraging screening through 2008.

Hypotheses of responses to contingency were also re-examined in this experiment, due to the limited data collected in the pilot experiment. Specifically, disincentives were predicted to be more effective than incentives at promoting screening, both for co-payments and medical costs based on speculation about trends observed in the previous analyses of the pilot data. Though high correlations but no significant differences had been found between responses to the incentive screening and both disincentive items in the previous study, it was expected that more significant variance in responses, even within groups, would be observed in a larger sample.

Since regulatory focus items were included in the survey after the contingency scenarios, it was predicted that responses to these questions would be telling of an effect of incentives. In particular, participants were expected to express greater satisfaction in response to the possibility of successfully getting screened in the next six months than dissatisfaction for failing to get screened. This is based on the findings of the experiment with the undergraduate sample in conjunction with the results of the pilot study. For both the prevention and detection behaviors in the first experiment, differences in regulatory fit arose only on items measuring perceived satisfaction at the prospect of successfully performing the behavior. Specifically, the participants exposed to incentives expressed greater satisfaction at the prospect of successfully performing the targeted behavior than those who received disincentive messages for both prevention and detection behaviors. Contingency did not result in significant differences in responses to any regulatory fit items regarding response to failure at completing the target behavior. Thus, perhaps

it is the effect of incentives to engender a promotion-focus, or, in other words, to promote satisfaction with or at least direct attention to the positive aspects of completing the targeted behavior and thereby moving toward the ideal self.

Yet in the pilot community sample study, both incentives and disincentives encouraged screening at low amounts (between \$10 and \$20 per month), which were not significantly different, but were positively correlated. Unlike the younger population, among whom differences in responses to incentives versus disincentives had been found, both types of contingency engendered similar responses among older participants. Given the common responses to both incentives and disincentives by the older population, contingency as a whole may have a common effect with regard to regulatory focus for such populations as well.

Whether performing a behavior would result in the reception of rewards or the avoidance of a punishment, performing the behavior itself might be perceived as more appealing when contingency is made salient, especially among older populations, as contingency may heighten focus on procuring positive outcomes by screening (promotion focus) rather than engender concern with negative outcomes (prevention focus). This would explain why significant differences were observed only in the successful behavior completion items and in both the matched (experimental) and non-matched (control) groups for the screening items with the undergraduate sample, as well as why responses to both incentive and disincentive items in the community sample study were so highly correlated. Participants in this study were therefore expected to show a preference for performing the behavior, because an approach strategy of completing the behavior would best match a promotion focus.

3.3.2 Method

3.3.2.1 Participants

Participants were male and female volunteers ($N = 25$) over the age of 50. Compensation for completing the study was the possibility of gaining further information on colorectal cancer and screening tests for it.

3.3.2.2 Procedure

The survey was uploaded to a secure, subscription-based online program (www.surveymonkey.com) designed for academic experimental use, which was set so that no identifying information or IP addresses would be recorded. It was then posted as links on Craigslist under the “volunteers” section and on the SPSP (Society for Personality and Social Psychology) listserv. Participants were able to become involved in the study by clicking on the link and answering a required eligibility question regarding age—which was included so that responses from ineligible individuals younger than 50 could later be eliminated from analyses—and then were able to complete the full questionnaire.

The survey was constructed such that participants were first asked about their attitudes toward the effectiveness of both health insurance and government in encouraging preventive colorectal cancer screening. Participants rated this coverage on a scale from 1 to 4, with 1 = *very good*, and 4 = *very bad*, and a final option “Don’t know.” Efficacy was then assessed by items pertaining to perceived ease, inconvenience and unpleasantness in receiving colorectal cancer screening. Responses were coded on a Likert scale from 1-7, with 1 = *not at all* and 7 = *very*.

Next, participants received an article containing general information on colorectal cancer and screening, which also served as the incentive to participate in the test. Immediately following

the article, the same four contingency questions from the pilot study with the community sample (gain-frame x incentive for both screening and treatment and loss-frame x disincentive for both screening and treatment) were included in the survey. Answers to these questions, however, were converted to percentages due to the chance that individuals outside of the US with different monetary systems might participate. The validity of any answers they would have given to contingency questions based on a dollar system would have been questionable. Furthermore, no questions were included about the location from which the participants were taking the survey, so this could not have been controlled for in analyses. Thus, answers to the questions “How much of an increase [decrease] in your monthly payment would this insurance plan have to propose for you to get screened for CRC now?” ranged from less than 1% to 100% or greater, with the final choice as “I would not get screened.” Again, the scale for the incentive treatment item differed, ranging from “5% co-pay per month on future cancer treatment” to “1% co-pay per month on future cancer treatment,” and a final option of “I would not get screened.”

As in the study with the undergraduate sample, a final series of questions then assessed efficacy a second time, as well as intentions to receive screening through responses to the statement: “How likely is it that you will TRY to get a colorectal cancer screening exam in the next 6 months?” Responses were recorded on a seven-point scale: from 1 = *extremely unlikely* to 7 = *extremely likely*. Regulatory fit was also assessed subsequent to exposure to the contingency-messages through the same two measures as before: “How would you feel if you were able to successfully get screened for colorectal cancer in the next 6 months?” and “Imagine that you tried and failed to get a colorectal cancer screening exam in the next 6 months. How would you feel about this?” For these questions, responses were recorded on a scale from 1 to 19, with 1 = *very bad* and 19 = *very good* (Higgins, 2000).

In this survey, type of behavior was not manipulated as a variable as it was in the first experiment; rather, it was included in a different way. When the study with the undergraduate sample failed to replicate the interactions between message frame and type of behavior that are typically reported in the message framing literature, it was observed that this failure was likely due to the fact that message framing experiments use a pamphlet or passage to explain and thereby prime the behavior before giving the gain/loss message. However, that study did not include any such passage, although the pilot study did. Colorectal cancer screening, which was the detection behavior presented to every participant in this survey, was therefore primed with a short passage about the different types of screening (including FOBT, sigmoidoscopy, and colonoscopy) immediately before the message in these questionnaires, in order to ensure that the message framing paradigm was mirrored as closely as possible.

Additionally, the hypothetical contingency scenarios were not varied by participant. Instead of randomizing participants into one of four conditions, each with just one scenario, this survey had a within-groups design regarding contingency. All participants received all four contingency items—two regarding cancer screening and two regarding cancer treatment—, just as the participants of the pilot study did. The purpose of this was fourfold. First, this was done to further examine the effects of contingency in more realistic scenarios, by drawing from and comparing current programs, such as consumer-directed healthcare, in which the adoption of preventive health behaviors result in a reduction in insurance premiums, and the German law, in which screening behavior will affect subsequent treatment costs, if individuals develop cancer. Second, the within-groups design regarding the hypothetical scenarios was repeated from the pilot study because participants' reactions to each of the different designs were deemed relevant to expose individual preferences of effective monetary values in incentives vs. disincentives. Third, the within-groups design also required a smaller sample. Because this was a community

study, recruitment was expected to be more difficult than it was to get participants from the undergraduate subject pool. Finally, these questions were reincorporated, as this survey ultimately sought to augment the data set for the contingency questions.

A final point to note is that participants in this experiment could have been in any stage of the screening adoption process, and thus were still eligible even if they had undergone screening previously. PAPM measures were excluded primarily to facilitate the Institutional Review Board process and avoid complications that may have arisen with them for an online survey that would have otherwise collected medical information.

3.3.3 Results

3.3.3.1 Demographics

Of the 25 participants who participated in the online survey, one did not complete it and one was excluded from analyses, because she did not meet eligibility criteria for age. The average age of the remaining 23 participants was 61.31 ($SD = 9.05$), of whom 14 (58.3%) were female. The majority of participants (91.7%) identified as White/Caucasian, while one person identified as White/Caucasian and Black, and one as Asian/Asian American. Twenty-two (91.7%) reported that they currently had some kind of healthcare coverage, and one participant declined to answer.

3.3.3.2 Attitudes toward Healthcare

In general, participants were much more positive and knowledgeable about their insurance provider's comprehensiveness in covering cancer screening and treatment costs than the government's effectiveness in doing either. Insurance screening coverage was in fact rated very highly ($M = 1.64$, $SD = .58$). Only one person was unsure of his/her cancer screening coverage.

Of the rest, all but one rated this coverage as either “good” or “very good.” For cancer treatment, three individuals expressed uncertainty about the comprehensiveness of their plans in covering these costs, whereas all other participants but one again rated their policies as either “good” or “very good” ($M = 1.7$, $SD = .57$). Ratings were much more negative for government effectiveness in covering both screening costs ($M = 3.2$, $SD = .86$) and cancer treatment ($M = 2.93$, $SD = 1.10$). Differences between the means for beliefs regarding insurance and government coverage of cancer screening were significant ($t(14) = -5.87$, $p < .001$), as were differences between beliefs about coverage of cancer treatment by the insurance and the government ($t(14) = -3.85$, $p < .01$). Only one person rated government effectiveness at covering screening costs as “very good.” Two participants gave this rating to government coverage of cancer costs.

3.3.3.3 Intention and Efficacy Items

Reported intentions to receive screening were low ($M = 3.88$, $SD = 2.28$). Independent samples t-tests revealed no significant gender difference ($t(14) = -.03$, $p = .98$).

Responses to efficacy measures varied. For the item regarding the ease of colorectal cancer screening, responses tended towards “not at all easy” ($M = 3.18$, $SD = 1.98$). However, for the items assessing inconvenience ($M = 3.21$, $SD = 1.58$) and unpleasantness of screening ($M = 3.26$, $SD = 1.94$), responses were more skewed to the positive answer choices “not at all inconvenient” and “not at all unpleasant,” respectively. After reverse coding the “ease” item, paired samples t-tests were conducted. Though the differences between the responses to the inconvenience and unpleasantness questions were not significant ($t(22) = .46$, $p = .65$), significant differences did exist between the means for both the ease and inconvenience items ($t(16) = 3.43$, $p < .01$), as well as between the means of the ease and unpleasantness items ($t(16) = 2.93$, $p = .01$) (see Figure 6 on the next page).

One point to note is that the aforementioned means represent the responses to the second set of efficacy items after participants had read the article on colorectal cancer and screening. Means for the ease ($M = 3.22$, $SD = 1.93$), inconvenience ($M = 3.57$, $SD = 1.44$), and unpleasantness ($M = 3.43$, $SD = 1.62$) items answered prior to reading the article showed the same trends, with ease of screening rated less positively on average than the other efficacy measures. Again, the latter two means did not differ significantly ($t(22) = .46$, $p = .65$); however, the differences between ease and inconvenience ($t(22) = -2.74$, $p = .01$) and ease and unpleasantness ($t(22) = -3.45$, $p < .01$) were significant. Furthermore, differences between pre- and post-article efficacy items also were not significant for the two items assessing ease ($t(16) = .36$, $p = .72$), inconvenience ($t(18) = 1.10$, $p = .29$), or unpleasantness ($t(18) = 1.16$, $p = .26$).

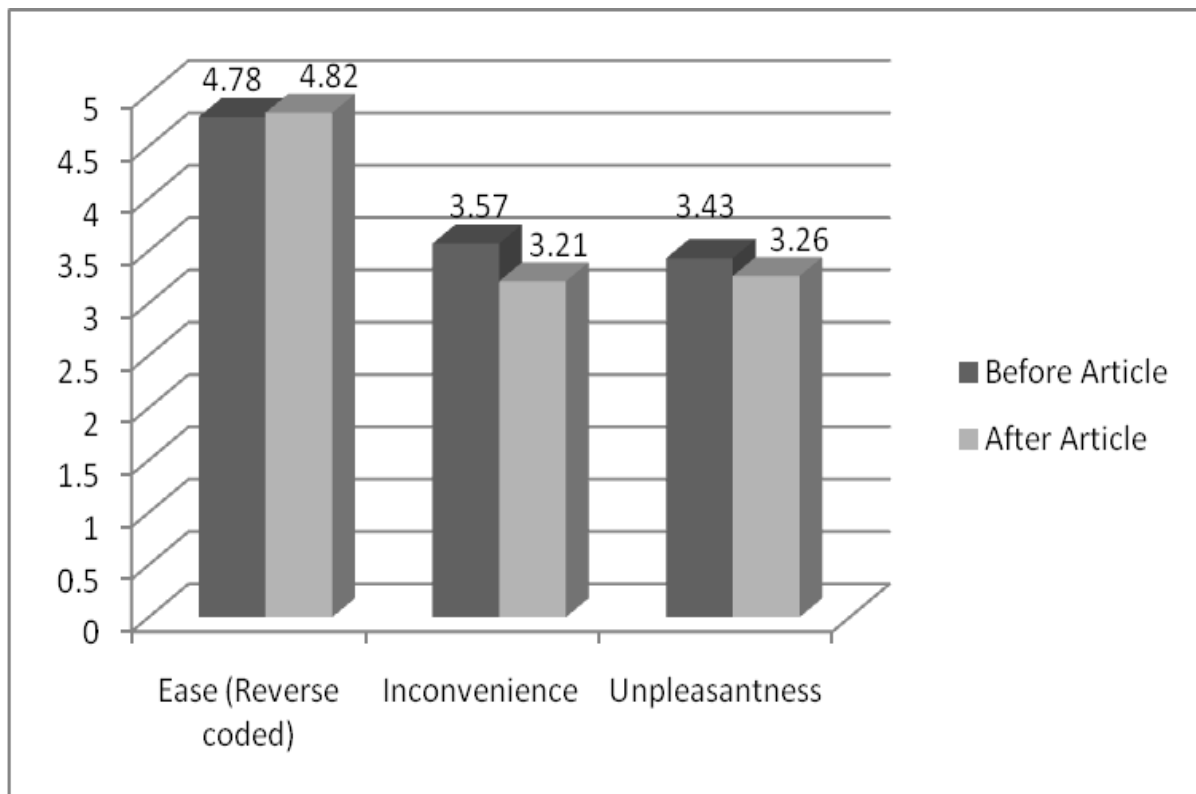


Figure 6. Mean responses to efficacy items as a function of time and measure from 1 = not at all to 7 = very

3.3.3.4 Contingency Questions

Once again, answers to the open-ended incentive question were characterized by a great deal of variability. Responses ranged from \$0 to \$1000 ($M = 108.52$, $SD = 217.89$).

Descriptive analyses of the contingency scenarios again revealed differences in the mean responses to each of these items (see Figure 7). The incentive treatment item [9] again received the highest mean response ($M = 3.10$, $SD = 2.02$). This time, however, responses to the disincentive screening item [6] were the lowest ($M = 1.90$, $SD = 1.22$). For the disincentive treatment item [7] the reported effective monetary amount was the second lowest of the scenarios ($M = 2.05$, $SD = 1.20$), whereas the incentive screening scenario [8] again resulted in the second highest mean response ($M = 2.45$, $SD = 2.06$).

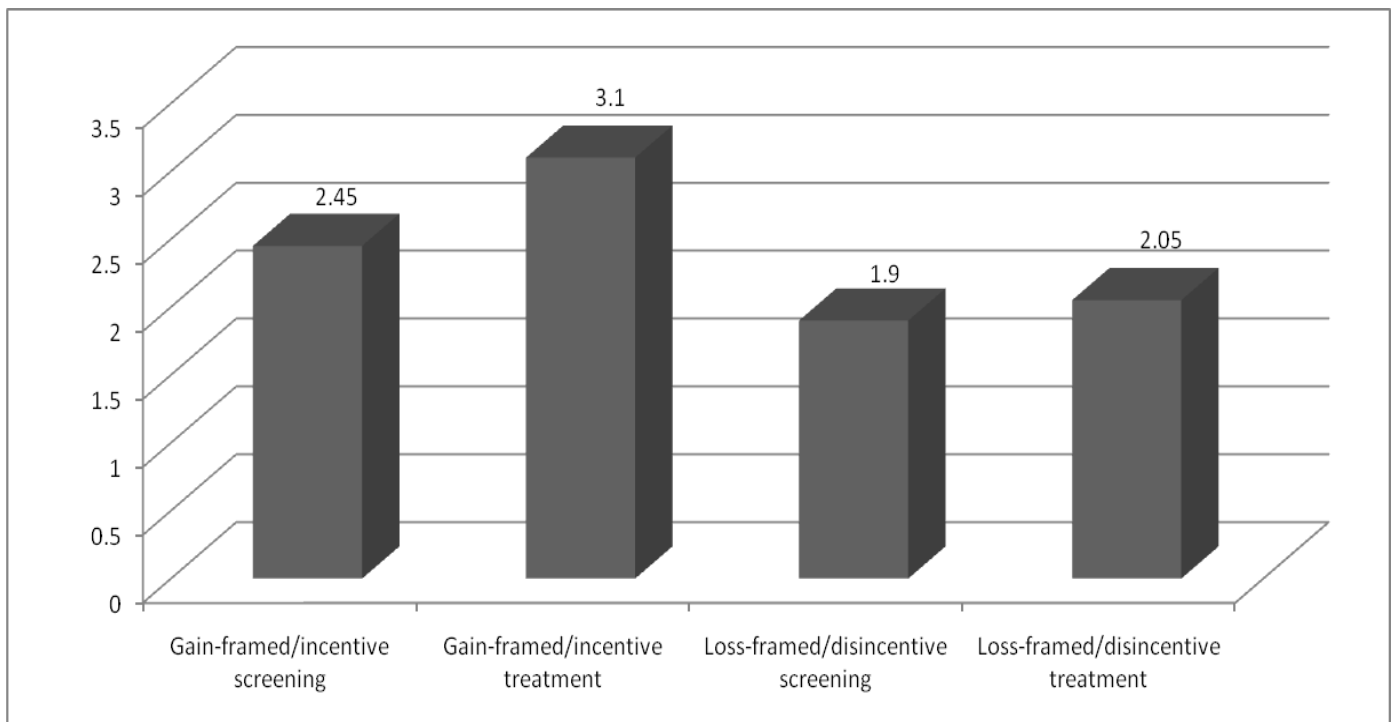


Figure 7. Mean reported monetary percentages for effective contingency interventions as a function of type of intervention and behavior

Paired samples T-tests comparing these means, again revealed no significant differences; however, trends toward significance were even more marked in this study. There were no

significant differences between the responses to the disincentive scenarios ($t(19) = -1.14, p = .27$). In fact, these analyses showed that the difference between the means was moving slightly away from significance in comparison to the results obtained for this t-test in the previous study ($t(7) = 1.43, p = .20$). Further analyses revealed that the responses to the two disincentive items were also significantly correlated ($r(18) = .89, p < .001$), as they had been in the previous study. When the responses for the incentive and disincentive screening items were compared this time, however, means again did not differ significantly ($t(19) = -1.50, p = .15$), but were approaching significance, especially in comparison to the results of the t-tests in the previous study ($t(7) = -.26, p = .80$). These items remained significantly correlated at the $p = .05$ level ($r(18) = .51, p < .05$), as they had been in the pilot ($r(6) = .80, p < .05$). Responses to the incentive screening and disincentive treatment also remained significantly correlated ($r(18) = .46, p < .05$).

Z-scores were again calculated for comparison with the incentive treatment question. This time, responses to the incentive treatment scenario were significantly correlated with both the disincentive screening ($r(18) = -.57, p < .01$) and the disincentive treatment ($r(18) = -.45, p < .05$) items, but not to the incentive screening question ($r(18) = -.18, p = .46$). This latter correlation, however, is still noteworthy and may reach significance with a larger sample size. Whereas in the pilot study, responses to this item were not correlated with any of the other contingency scenarios, it is interesting that they became significantly correlated with the responses to both of the disincentive items given a larger sample size, but not with participants' responses to the other incentive question. An additional point to note is that all of the correlations are negative, suggesting that the higher[lower] the monetary amount selected in response to the incentive treatment item, the lower[higher] the amount selected for both of the disincentive scenarios and even for the incentive screening scenario, albeit not significantly in this latter case.

3.3.3.5 Regulatory Focus

Analyses showed that responses to first item assessing satisfaction with the successful completion of the behavior were higher ($M = 14.74$, $SD = 4.60$) than the responses to the question assessing dissatisfaction at failing to perform the behavior ($M = 5.82$, $SD = 3.43$). When the responses to the latter item were reverse coded, however, paired samples t-tests of the two means revealed no significant difference between these means ($t(16) = -.04$, $p = .97$), contrary to what had been predicted. Since the means of the regulatory fit items did not differ significantly, no general effect of contingency salience on regulatory focus was observed.

3.3.4 Study 3: Discussion

Though the hypotheses regarding regulatory focus were not supported, this survey revealed general attitudes towards current coverage of cancer screening and treatment, both by insurance providers and the government. In general, participants rated their insurance coverage very positively with regard to both colorectal cancer screening and treatment, but were much less positive about the government's effectiveness on these topics. This makes sense, given that the Pennsylvania legislature just instituted a law mandating colorectal screening coverage in 2009. Though the survey was online, it was advertised on the Pittsburgh Craigslist, so it is likely that at least some participants were Pennsylvania residents, although no questions asked for location of the participants to confirm this. Even for those who were not Pennsylvania residents, the US has no national program for colorectal cancer screening, so reference to the federal government's involvement would have been validly represented by the participants' responses, as well.

Analyses of perceived efficacy in colorectal cancer screening further revealed beliefs that perceived ease of screening is significantly lower than perceived inconvenience or

unpleasantness of the tests. These results were consistently found in efficacy measures answered both before and after reading an article that provided information about colorectal cancer and the corresponding screening tests. Such findings suggest that attitudes about screening are more negatively skewed with regard to actually receiving the test rather than peripheral attitudes such as inconvenience or unpleasantness.

Results of this study also provided evidence to support the predictions made based on the findings from the pilot study: namely, that there are differences between incentives and disincentives, which would approach significance with a larger sample size. Indeed, results from this study indicate trends in the expected direction. Furthermore, participants' responses to both disincentive scenarios were, again, significantly correlated. As in the last experiment, one participant chose the highest response on the scale: "I would not get screened." This participant's responses were included in statistical analyses because he/she did respond to both disincentive questions; in fact, he/she chose the second lowest amount (5% per month) on both disincentive items. In this individual's case, disincentives were successful in promoting screening, whereas incentives were not. Because incentives failed to work in one case for both community sample studies, whereas disincentives were universally convincing, this possibility for differential effects on behavior by incentives versus disincentives merits further inquiry among a larger sample.

On that note, one limitation of this study was, still, the sample size. Though larger than the pilot study, and large enough that some significant findings and trends were observed, a bigger sample would have been ideal for obtaining more conclusive results.

Another potential limitation was that answers to the contingency items were converted to percentage scales to allow for the possibility that other individuals in countries with different monetary systems would also be able to answer, since it was an online survey. The argument could be made that this conversion from raw numbers to percentages may have led to the trends

toward significance observed in the analyses. In fact, perhaps these findings are not comparable at all to the findings from the previous study, but rather are different responses chosen from different scales. Yet the trends observed in this survey were consistent with the predictions made in the pilot study about what would happen with a larger sample size. There was one exception to this, and that concerned the incentive treatment item. Responses to this scenario were negatively correlated with all other contingency items, which seemed surprising, especially with regard to the other incentive item. One would expect that, if responses to both disincentive scenarios are positively correlated, responses to both incentive measures should be positively correlated also. Recall, however, that correlations among the disincentive responses were highly significant, whereas responses among the incentive scenarios were not significantly correlated. This leaves open the possibility that the negative correlation may have disappeared with a larger sample size. Either way, further testing would be necessary to answer these questions sufficiently.

This study also could not examine the relationships between contingency and chronic regulatory focus or stages of behavior change in the adoption of cancer screening (as contextualized in the PAPM). In fact, previous screening behavior was not assessed at all for the aforementioned reasons. These would be important avenues for future studies on contingency to pursue. Such information would be valuable for healthcare providers and governments alike, as both patient compliance and participation in screening programs are related to maintenance behaviors. If the use of contingency is more successful in certain stages than others or if there is a point along the spectrum of behavior change at which the use of contingency is optimal, this knowledge would greatly improve uptake of screening. Previous PAPM studies suggest that this may be the case, as efficacy has been shown to aid the transition between the stage in which a person has decided to act to and the stage of acting (Weinstein, Lyon, Sandman & Cuite, 1998).

Furthermore, that the hypothesis regarding regulatory focus was not supported may have resulted from the within-groups design of this study. In the experiment with undergraduate participants, significant differences in both intentions to undergo screening and in regulatory fit were observed between the contingency conditions. Meanwhile, in the previous community sample study, incentives and disincentives seemed to promote screening at similar monetary amounts, and thus were believed to have a common effect on screening behavior. These divergent results of the two studies were attributed to the different ages of the participants. Given this assumption that incentives and disincentives engender a common response among older populations, contingency as a whole was also predicted to have a common effect on regulatory focus among older participants. However, the small sample size of the pilot study may have masked an extant difference between incentives and disincentives. Trends suggesting that such a difference may exist even among older populations were revealed in the results of this study. The hypothesis for this survey regarding the relationship between contingency and regulatory focus, however, relied upon the condition that incentives and disincentives had the same effect. If these two constructs differentially impact responses in older populations as they did among younger participants, no effect would have been observed on participants' responses to the regulatory fit items, as participants received both incentive- and disincentive-based messages first. Any effect that incentives or disincentives may independently have on regulatory focus would have also been obscured by exposing participants to both constructs. Thus, a between-groups design would have better examined the relationship between contingency and regulatory focus.

Future studies should therefore not only include assessments of PAPM stage and chronic regulatory focus, but also manipulation of contingency variables in a between-groups design. Moreover, contingency scenarios should be developed in parallel for incentives and disincentives, because of the contradictory findings regarding the responses to the incentive

treatment item from this and the previous study. Specifically, such studies should include an incentive treatment question that mirrors the current disincentive treatment item, as well as a disincentive treatment item that mirrors the construct of the incentive treatment question, as some current legislation does use contingency in this way (like the German law).

Accordingly, if these questionnaires were expanded, future studies should administer them to participants in many different countries in order to examine the effects of contingency in various cultural contexts. Responses to contingency may vary in virtue of the different healthcare systems and practices of different countries. Knowledge of such cross-cultural differences is increasingly pertinent, as governments throughout the world incorporate the various constructs of contingency into actual legislation, thereby laying the groundwork for a natural experiment on contingency on a state and national scale. Germany has begun to employ disincentives to encourage screening, whereas England promotes screening uptake through the use of efficacy. Japan and some US states have even begun to consider the use of incentives to this end.

Prerequisite to such an experiment is the necessity for a survey of current programs and screening rates, as such comparisons that currently exist in the literature are limited to one or two countries or confined to geographic regions, such as the EU. Thus, the final step of this series of studies was to conduct a preliminary natural experiment by comparing the frameworks of existing screening programs and assessing broad trends in screening behavior across countries.

3.4 STUDY 4: ARCHIVAL ANALYSIS OF SCREENING LEGISLATION

To complete this analysis of contingency, a cross-cultural archival component, with the aim of assessing trends in national and international participation rates and correlating them with

aspects of government intervention, was included. In the literature, there are many studies reporting the cost-effectiveness of or expected mortality reduction achieved through mass colorectal cancer screening, for these are the questions most central to a policy maker's decision to implement a screening program. However, the results of such studies are often based on achieving a set screening rate—sometimes as great as 50-60%—, as they rely on pilot data or the success of screening programs in other countries to draw their conclusions (Ministry of Health, 2006). If a screening program is instituted because it is reported prospectively to achieve a given outcome, the cost-effectiveness and mortality reduction figures will be dependent upon the attainment of that screening rate. Yet little comparative research has been conducted on which contingency programs work best and to what levels various types of mass screening interventions can be expected to raise participation rates. These questions regarding which types of interventions are useful public health policy tools for raising the screening rate levels to the target required for the programs to be maximally effective and best serve the people they are designed to protect remain largely unanswered. Thus, the assumption that a given level of participation will be attained when an intervention is implemented is a logical flaw in many of these studies that purport to predict the medical outcomes of such programs and thus underlie policy makers' decisions.

This archival study sought to provide evidence in support of the implementation of national screening programs. Screening behavior and public policy across European countries, the United States, Canada, Australia, Japan, and Korea—all of which at least had documented national screening data and some of which had implemented governmental mass screening programs—were examined. The programs of each country were rated on the degree to which each program exemplified the spirit of a type of contingency and the degree to which they facilitated access to screening. This examination was aimed at uncovering patterns and

relationships between screening participation and aspects of the various interventions currently being implemented throughout the world.

In the case of the United States, there is no screening program at the federal level, but state governments have in recent years imposed legislation mandating varying degrees of insurance coverage of colorectal cancer screening. As alluded to in the discussion of state laws in section 1.2.2, considerable variance in the stipulations of many state laws exists, in terms of comprehensiveness of the mandate and efficacy in covering costs of screening. So, although the US programs were not included in international comparisons due to the variability in the state-level legislation, state laws also merited attention. The relevant legislation or statute in each state's constitution was therefore examined and rated on several dimensions before being correlated with the respective screening rates for that state. Though various types of insurance, such as consumer directed healthcare programs, have been gaining popularity in the US, they were not included in any analyses, as the majority of the population does not yet belong to these types of programs, nor are these programs included in governmental intervention.

3.4.1 Hypotheses

First, [1] states and countries with screening legislation or programs were predicted to have higher screening rates than those without. For both state legislation and national programs, [2] the higher the degree of efficacy provided, the higher the screening rates were predicted to be. Specifically, states with legislation that mandated the most comprehensive coverage of the costs of the screening tests, and offered the greatest degree of patient choice in determining which test to receive were expected to have higher screening rates than those with less comprehensive coverage and less patient input in screening. This is because both of these elements were

believed to increase consumer efficacy, and, therefore, encourage screening more effectively. Additionally, the scope of the mandate was expected to be correlated with screening rates, as the more insurance providers required in the legislation to cover costs, the greater the number of consumers who benefit and can participate. For the cross-cultural comparisons, programs offering the greatest degree of efficacy in receiving screening were predicted to be correlated with the highest screening rates. Finally, [3] since colorectal cancer screening is a detection behavior, countries with the most disincentive-oriented programs were believed to have the highest levels of screening compliance, whereas countries with incentive-oriented programs were believed to exhibit the lowest screening rates. Efficacy-oriented programs were believed to have screening rates in between these two extremes.

3.4.2 Procedure

3.4.2.1 State Analyses

Screening rate data from 2006 were collected from a United States government website run by the National Cancer Institute <http://statecancerprofiles.cancer.gov/> for comparative state analyses. Three types of data were collected: 1) FOBT screening rates in both the past year and past two years; 2) endoscopy (sigmoidoscopy/colonoscopy) screening rates for both the past five years and the past ten years; and 3) all screening tests according to regulations over the past five and past ten years. Each data set was collected for men, for women, and then for both. These data were exported into Excel format and then analyzed using SPSS. The screening laws were accessed on individual state legislature web-sites. In only one case—that of Washington D.C.—was the state legislature website unavailable. A commissioned report delineating the points of the relevant legislation was examined for this case, instead. Laws were then analyzed by reading

through the text and rating the program on five dimensions—including comprehensiveness of the mandate and efficacy in covering costs of screening, and degree to which individuals are able to choose which screening tests they would undergo. This was done on two different occasions. The legislation was rated on Likert scales from either 1-5 or 0-5 on all five dimensions for each state: 1) Financial Efficacy (1 = no costs covered to 5 = all costs of all tests covered), 2) Comprehensiveness of Cancer Prevention (1 = no test covered to 5 = all tests covered according to ACS guidelines), 3) Mandate Comprehensiveness (0 = No mandate for any insurance plans to 5 = All health insurance plans), 4) Population Targeting (1 = No one covered to 5 = Everyone as defined by ACS guidelines is covered), and 5) Choice efficacy (1 = No choice of test to 5 = Individual, or individual and doctor, may choose test) (See Appendix E).

Twelve states—Alaska, Colorado, Kentucky, Maine, Minnesota, Nebraska, New Mexico, Pennsylvania, and Washington—currently have screening laws, which were rated and used in descriptive analyses. However, their legislation did not come into effect until after 2005 (Entertainment Industry Foundation National Colorectal Cancer Research Alliance, 2005). These states were therefore coded as states without screening laws for the purposes of comparative and correlational analyses, because screening data was collected from 2006, at which point these states had not yet implemented legislation. Though Alaska passed such a law in 2006, no date could be found referencing when it went into effect. Accordingly, it is unknown to what degree this would have affected screening rates, especially given the typical response and recognition lags associated with the implementation of public policy. One final point is noteworthy in light of the fact that the data used was taken from 2006. State legislation for this study was analyzed based on the original provisions under which the laws came into effect. Provisions or addenda that have been added to the legislation since 2005 were excluded from the ratings collected for

these analyses. Thus, every effort was made to ensure that the data could be compared with the contemporaneous situation established by the legislation.

3.4.2.2 Cross-cultural Analyses

First, screening programs were examined in each country in which they exist to any extent. Sources for these analyses included government websites, the National Institutes of Health, and various reports comparing aspects of some of the current programs, developed both for publication in journals and for presentation to the European Commission. These programs were rated on Likert scales by type of program (1 = No program, 2 = Pilot underway, 3 = Regional program, 4 = Opportunistic, 5 = National program), incentive used in the program (1 = Incentive, 3 = Efficacy, and 5 = Disincentive), and degree of efficacy provided by the framework of the program (1 = None, 2 = On your own (opportunistic), 3 = Distributed by the doctor/GP provider, 4 = Invitations are mailed, 5 = Invitations, tests, and instructions are mailed, 6 = Invitations, tests, and instructions are mailed along with a personal communication).

The most recent national screening rate data were then collected from government websites whenever it was available and could be found in German, French, or English. These data usually comprised screening rates from 2006 or 2007, and no data from before 2000 counted for the purposes of this study. Screening rates for Germany, Ireland, Switzerland, France, Japan, Korea, Finland, Spain, the United States, and Slovakia were found from their respective government or Health Ministry websites.

For those data that could not be found or were not available due to a lack of national data collection efforts by governments, one of two methods was used. First, if national data was unavailable in a government source, the screening rates would be found in studies or pilots that assessed both baseline and post-manipulation screening levels, with the baseline or control

screening rates taken as a measure of screening uptake. For example, national screening rates for Israel could not be found on any government or government ministry websites, so they were taken from a study examining the effects of a more formal invitation based screening paradigm in contrast to the opportunistic screening program currently in effect by the Ministry of Health. In that study (Ore, Hagoel, Lavi & Rennert, 2001), the baseline screening rate served as the measure of the current national screening rates, which is the figure that was used for analyses in this study. If pilot tests with this information also were not available, the European Commission-sponsored survey from 2007 called the “Eurobarometer survey” was consulted. This survey, administered across all European Union countries, specifically assessed FOBT screening behavior in the past year. Since most screening programs, such as those in England, France, Japan, Slovakia, Australia, and Finland are FOBT-based, screening rates are generally reported in terms of FOBT participation, with follow-up colonoscopy participation rates separately reported. Thus, the Eurobarometer survey did not pose a concern with regard to comparing data with these countries.

However, other countries, such as the US and Switzerland tended to report aggregate screening data of participation in FOBT and endoscopy, though participation in each of the tests is also specified. Thus, FOBT screening rates for Switzerland and the US were selected for the purpose of analysis. For both Germany and Poland, colonoscopy is a primary screening tool. Since higher participation is associated with FOBT screening in Germany, however, FOBT screening rates were selected. The national program in Poland, however, only advocates for colonoscopy screening, so FOBT uptake was deemed unrepresentative of the true screening rate. As a result, the screening figures for colonoscopy were used in analyses.

3.4.3 Results

Ratings were first compared for reliability, and all ratings for both states and countries were identical except one dimension for two states, which resulted from misreading the first time.

3.4.3.1 State Analyses

(a) Descriptives

Overall, 32 states had some kind of screening legislation by 2009, whereas 19 had none. Of the states with legislation, the majority (43.8%) had laws mandating insurance coverage of all of the tests, albeit subject to co-payments and deductibles at the discretion of the provider, and the laws in only eleven states (34.4%) explicitly limited the application of co-payments and deductibles to screening coverage within the legislation. Most legislation (46.9%) mandated coverage by the majority of insurance providers in the state, with only a few exceptions, and fourteen states (43.8%) mandated coverage by all insurance providers within the state. Approximately half (46.9%) of all state policies required coverage according to American Cancer Society guidelines, while one quarter (25%) of the laws had vague guidelines concerning screening coverage. The vast majority (62.5%) of all screening laws required coverage to be provided to all individuals as defined by the ACS, whereas eight states (25%) required coverage for individuals age 50 and older and at high risk, but defined high risk in a way that fell short of ACS guidelines. However, a high percentage of state laws (59.4%) failed to enumerate among the provisions the ability of the patient or doctor to choose the test. Only seven states (21.9%) explicitly required that the choice of test remain at the discretion of the primary care provider (PCP), and legislation in only four states provided consideration for patients' preferences in selection of the screening test.

Finally, legislation in only two states—Alaska and Arkansas—explicitly required insurance providers to communicate the coverage of these tests to their clients.

Screening rate averages were low in all analyses. FOBT participation in the last year ranged from six to 20 percent ($M = 16.11$, $SD = 3.09$) but was higher when participation over the last two years was considered ($M = 24.63$, $SD = 4.19$). In both cases, men ($M = 16.74$, $SD = 3.41$) and ($M = 24.95$, $SD = 4.29$), respectively, participated more than women ($M = 15.58$, $SD = 3.18$) and ($M = 24.35$, $SD = 4.44$). Paired samples t-tests revealed that these differences were significant ($t(50) = 3.57$, $p < .01$) with respect to FOBT screening in the past year, but not when FOBT rates over a two year period were considered ($t(50) = 1.69$, $p = .10$).

Endoscopy screening rates over the past five and ten years were much higher ($M = 49.39$, $SD = 6.00$) and ($M = 55.17$, $SD = 5.86$), respectively, than either measure of FOBT screening rates, reflecting preferences for sigmoidoscopy and colonoscopy over FOBT testing in the US. Based on endoscopy screening data over the past five years, men ($M = 50.02$, $SD = 6.43$) were again significantly more likely than women ($M = 48.84$, $SD = 5.93$) to receive an endoscopy ($t(50) = 3.09$, $p < .01$). Yet the gender difference between participation in men and women disappeared when screening rates over the last ten years were considered ($t(50) = .37$, $p = .72$).

Total screening rates (including both annual FOBT and/or endoscopy participation) over the last five years for all tests ranged from approximately 46 to 66 percent ($M = 55.53$, $SD = 5.70$), with men exhibiting higher rates ($M = 56.02$, $SD = 5.88$) than women ($M = 55.10$, $SD = 5.75$). This difference was significant ($t(50) = 2.99$, $p < .05$). Meanwhile, participation in all CRC screening procedures over the last ten years ranged from 50 to 70 percent across states ($M = 60.41$, $SD = 5.47$), with no difference when stratified by gender. Both men ($M = 60.43$, $SD = 5.73$) and women ($M = 60.38$, $SD = 5.44$) exhibited similar rates of screening participation, and any difference between the means was not significant ($t(50) = .16$, $p = .87$) (see Figure 8).

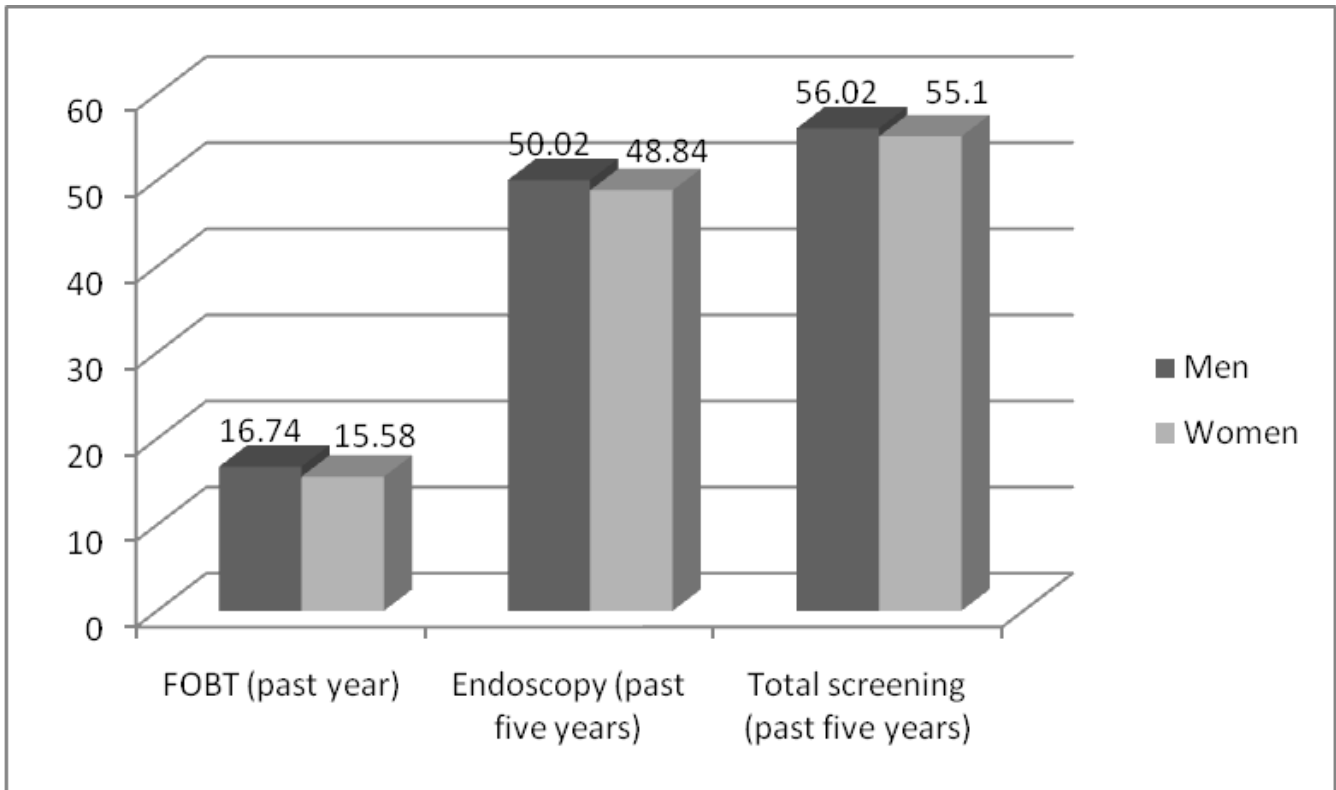


Figure 8. Screening participation rates as a function of test and gender.

(b) Hypothesis [1]

Independent samples t-tests revealed no significant difference between states with and states without screening legislation in FOBT participation either within the previous year ($t(49) = -.66$, $p = .51$) or within the past two years ($t(49) = -1.00$, $p = .32$). Even when screening rates were stratified by gender, no significant difference was observed between states with and without legislation. FOBT screening rates for men were no higher in states with legislation both when data regarding participation over one year ($t(49) = -.12$, $p = .91$) or two ($t(49) = -.79$, $p = .43$) were used in the analyses. Screening rates among women also did not vary based on state legislation, either when data from the one year period ($t(49) = -1.14$, $p = .26$) or from the two year data set were considered ($t(49) = -1.16$, $p = .25$).

Analyses of endoscopy screening rates over a period of five years also revealed no significant differences due to screening laws ($t(49) = .35, p = .73$). This lack of significance was observed both for men ($t(49) = .19, p = .85$) and for women ($t(49) = .54, p = .59$). When total endoscopy participation over the past ten years was considered, results moved even farther away from significance ($t(49) = .21, p = .84$), even when the data were stratified by gender.

Finally, aggregate screening rates for all tests did not differ significantly between states with and without legislation, both when a five year period ($t(49) = .06, p = .95$) or a ten year period ($t(49) = -.03, p = .97$) was considered. Additionally, no significance differences were observed for participation among men or women with either data set.

(c) Hypothesis [2]

Finally, data sets for FOBT screening, endoscopy screening, and total screening participation were correlated with three dimensions on which the state laws were rated: comprehensiveness of coverage (financial efficacy), degree to which patient was allowed to choose a screening test (choice), and scope of the mandate.

Analyses of FOBT screening rates revealed no significant correlations on the financial efficacy dimension, either for the one year ($r(49) = -.05, p = .71$) or the two year data set ($r(49) = -.10, p = .47$). For the choice variable, no significant correlations were found among states with screening laws for either data set, ($r(18) = -.19, p = .42$) and ($r(18) = -.28, p = .24$), respectively. Analyses of mandate comprehensiveness also revealed no significant correlations for the one year ($r(49) = .07, p = .63$) or two year ($r(49) = -.003, p = .98$) period. Furthermore, no significant correlations were found for any of these dimensions when FOBT data was stratified by gender.

Endoscopy screening data for the past five years was also not significantly correlated with financial efficacy ($r(49) = .07, p = .63$), choice ($r(18) = .03, p = .89$), or mandate

comprehensiveness ($r(49) = .16, p = .26$). For the ten year data set, results were not significant on any of these dimensions ($r(49) = .05, p = .74$), ($r(18) = -.01, p = .97$), and ($r(49) = .14, p = .33$), respectively. Moreover, no significant gender differences were found for any of these dimensions.

Finally, total screening participation over periods of five and ten years was examined. Analyses of the five year data set again showed no correlations with financial efficacy ($r(49) = .03, p = .82$), choice ($r(18) = .03, p = .89$), or mandate comprehensiveness ($r(49) = .13, p = .35$). The ten year totals did not ameliorate this, as none of the correlational analyses on financial efficacy ($r(49) = .02, p = .91$), choice ($r(18) = -.01, p = .97$), or mandate comprehensiveness ($r(49) = .12, p = .45$) were significant. Even when stratified by gender, results showed no significant correlation on any of these dimensions.

3.4.3.2 Cross-cultural Analyses

(a) Descriptives

Of the 36 countries analyzed, 15 (40%) were found to have screening programs in effect. Five of these programs were opportunistic, and nine were formal national programs. Only one country (Italy) had a regional program; however, for the regions in which the program is operational, it can be characterized as following a national program paradigm (formal invitations are mailed along with FOBT kits). Screening rates in each of the countries ranged from .06% in Israel to 90% in Uruguay (based on pilot data) with a mean of 18.15 ($SD = 21.83$).

(b) Hypothesis [1]

Independent samples t-tests confirmed the first hypothesis—that countries with screening programs would exhibit significantly higher levels of screening than countries without ($t(34) = 4.59, p < .001$). Because screening rates in Uruguay were so high and based on pilot data, t-tests were performed again without them, and results remained significant ($t(33) = 4.61, p < .001$). Additionally, since endoscopy screening is more common in Switzerland than FOBT screening and US screening totals are much higher than FOBT rates alone, t-tests were performed one final time with endoscopy and total screening rates in those countries, respectively (still without Uruguayan data). Still, the finding that countries with screening programs had significantly higher screening participation than countries without held ($t(33) = 3.60, p = .001$).

Univariate analyses revealed that screening rates differed significantly in virtue of the type of program in effect (no program, pilot program, regional program, opportunistic program, or national formal program) both without Uruguayan data ($F(4, 34) = 4.99, p < .01$) and with it ($F(4, 35) = 2.98, p < .05$). In both of these analyses, US screening totals were used.

(c) Hypothesis [2]

Correlational analyses were conducted to examine the relationship between degree of efficacy provided by the programs and the respective screening rate for the country. Uruguayan data was again excluded as a statistical outlier, especially because it was based on pilot results. Results revealed that the higher the degree of efficacy, the higher the level of screening participation, both when only FOBT rates were considered for all countries except Poland, ($r(33) = .70, p < .001$) and when US totals and Swiss endoscopy screening rates were included ($r(33) = .60, p < .001$). In both cases, these results were significant.

(d) Hypothesis [3]

After extensively researching the programs across 36 countries in North and South America, Europe, the Middle East, and Asia, 15 were found to have screening programs (see Table 5 on the following page). However, of those programs, 13 were efficacy-based. Only Germany was using a disincentive in any form, and some evidence was found that Japan incorporates incentives into its screening program by providing tax grants for cancer screening (Ministry of Health, Labor and Welfare, 1999). Consequently, there was not enough variability to conduct analyses to test the third hypothesis. As the use of disincentives and incentives become more popular within healthcare systems worldwide, it would be worthwhile to reexamine this point.

Table 5. National Colorectal Cancer Screening Programs

National Programs (Year Began)		Program	
		Screening Rate	Tests Offered
Australia (2008)*	National Organized	45% (Pilot)	FOBT/Col follow-up
Austria (2005)*	National	17%	FOBT/Sig/Col
Czech Republic (2000)*	National	7%	FOBT/Colonoscopy
Finland (2004)*	National Organized	70%	FOBT/Col follow-up
France (2008)*	National Organized	42%	FOBT/Col follow-up
Germany (1977-FOBT, 2002-Colonoscopy)*	Opportunistic	19% (FOBT); 12% (Col)	FOBT/Colonoscopy
Israel (2004)*	Opportunistic	0.06%	FOBT/Col follow-up
Italy (2000)*	Opportunistic (Col) Regional (FOBT)	44%	Col (free by law since 2000); FOBT regional; Sig. pilot underway
Japan (1992) ⁺	National	18.1%	FOBT/Col or Double Contrast Barium Enema follow-up
Korea (2004)*	National	16%	FOBT/Col or Double Contrast Barium Enema follow-up

Poland (2000)*	Opportunistic	10%	Colonoscopy
Slovakia (2002) ⁺	Opportunistic	30%	FOBT/Col follow-up
Switzerland (2005)*	Opportunistic	28% (FOBT); 32% (Sig/Col)	FOBT/Sig/Col
UK (2006)*	National Organized	67%	FOBT/Col follow-up
Uruguay (1997)*	National	90% (Pilot)	FOBT/Virtual Col follow-up

*Denotes 100% coverage of tests.

+Denotes screening subject to co-pay or deductibles.

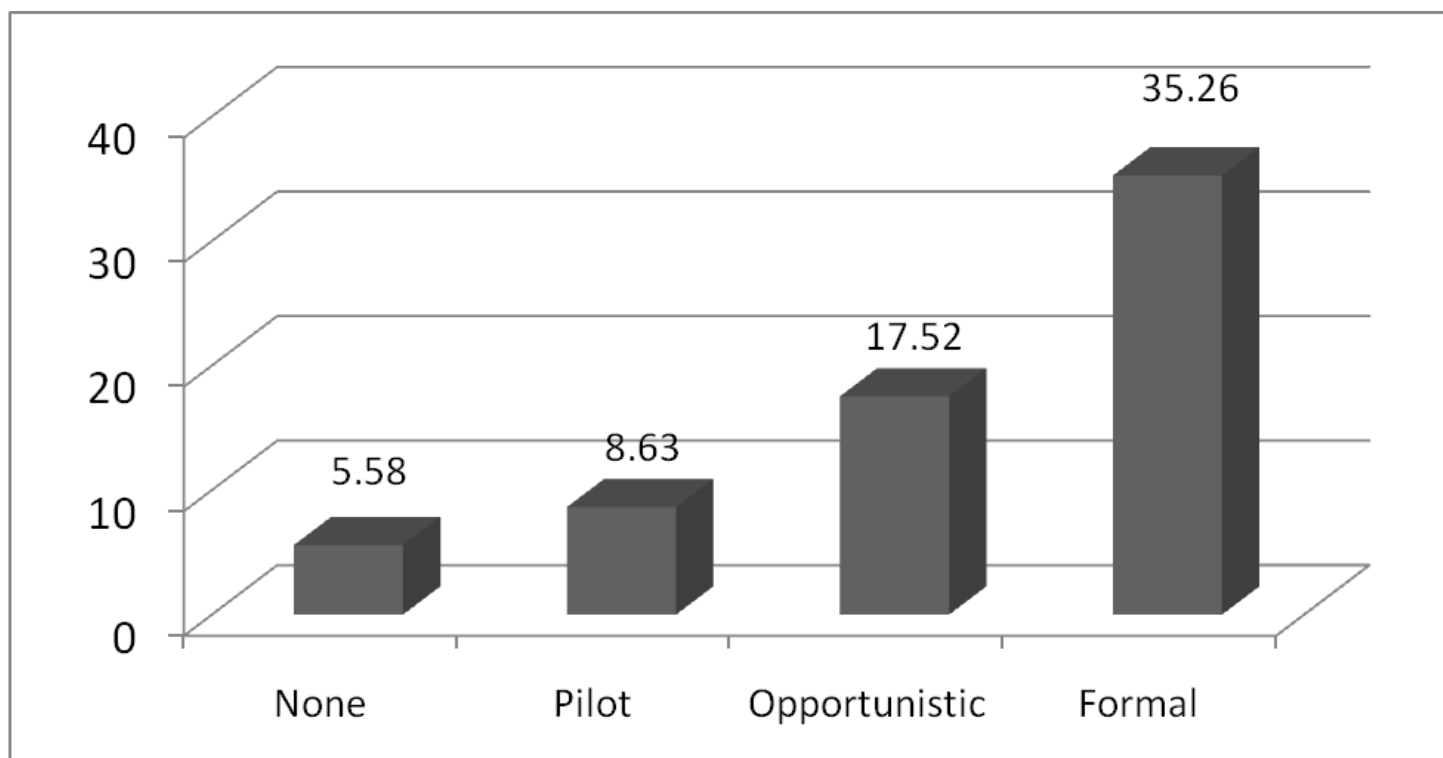


Figure 9. Colorectal Cancer Screening Programs as a function of type and screening rate

3.4.4 Study 4: Discussion

This study was aimed at surveying governmental programs and legislation regarding colorectal cancer screening, as well as uncovering trends in screening behavior across states and countries. Overall, 32 states and 15 of the 36 countries analyzed had some form of intervention in place. No significant differences were found in screening rates between states that had laws mandating insurance coverage of colorectal cancer screening tests and states that did not. Cross-cultural analyses did reveal significant differences in screening rates between nations that have and do not have screening programs, and these differences were significantly correlated with the degree of efficacy provided by the program. This leads to the question: why did interventions outside the US appear to be more successful at increasing screening rates than those within its borders?

One possible explanation may be that, even without laws mandating insurance coverage of the screening tests by all providers, a majority of providers already offer at least partial coverage. Indeed, the United States General Accounting Office (2004) examined the policies of 35 national plans as well as 19 small employer and 15 individual plans in ten states lacking laws to mandate insurance coverage of colorectal cancer screening tests. They found that, though coverage of colorectal cancer screening is not universal among insurance providers, even in states without legislation, most major health insurers cover the costs of these exams, at least to some extent. Laws that mandate insurance coverage may therefore affect relatively few individuals in terms of their preventive health behavior, as most insurance plans cover these tests already. Indeed, in the online survey study, all participants except for one were aware to some extent about their insurance providers' coverage policies regarding colorectal cancer screening. Among those who stated an opinion about how comprehensive their insurance coverage of the screening tests was, all but one rated their policies as either "*good*" or "*very good*."

Also, in the American Cancer Society study (2006a), results showed that the effect of these laws is to increase the screening rate more quickly in states with screening legislation than in states without it (see Figure 2). Attempting to replicate these findings was beyond the means of this study, as data sets that were available were only from 2006, so no comparative analyses with data from other years could be conducted.

Another part of the explanation for the apparent ineffectiveness of coverage legislation in raising screening rates above participation in states without such laws may be that the majority of state laws only mandate coverage that is reasonable with respect to other health benefits provided in the plan. In other words, laws in many states (fourteen) continue to allow the application of deductibles and co-payments. Only in eleven states' legislation are limits explicitly placed on these additional costs. In contrast, many of the screening programs abroad offer screening at no cost. Therefore, screening tests in the United States remain subject to co-payments and deductibles even among states with legislation, which may be enough to deter individuals who would screen if it were free from doing so when only part of the test is covered by insurance.

That no significant correlations on the financial efficacy variable were observed for both the FOBT screening data and the endoscopy data is also suggestive of the fact that the degree of efficacy these laws provide for receiving endoscopy screening is minimal. First, FOBT testing is substantially cheaper than endoscopy screening (Campbell, Coates & Chattopadhyay, 2006). In addition, unlike the national screening programs in England and France, individuals generally receive no direct communications to encourage screening uptake as a condition of state legislation. Only in Alaska and Arkansas do the laws even require providers to inform clients about screening coverage. Thus, one would expect that legislation mandating insurance coverage of screening tests would not affect FOBT uptake in any way, especially not in terms of financial efficacy, and so the findings in the correlational analyses for these data were unsurprising.

The difference in screening rates between states with such legislation and states without would be expected to be observed in endoscopy screening rates, either for sigmoidoscopy or colonoscopy, upon the institution of these laws. But no differences were observed in these analyses, either. Such legislation may provide only limited marginal efficacy for receiving endoscopy screening versus having no such laws. Even opportunistic programs such as those in Germany and Poland provide more efficacy for screening. Though they do not formally invite individuals to screen, they do at least offer complete reimbursement for endoscopy screening, the costs for which are high. State laws at best place limits on the degree to which co-payments and deductibles can be applied to these tests and at worst leave the determination of final costs of screening to the providers' discretion. As a result, there is no guarantee that screening exams are necessarily made more affordable by these laws. Whereas the implementation of this type of legislation continues to serve a purpose in ensuring that the maximum number of individuals is covered for cancer screening, its effect on raw screening rates may be only marginal.

Despite the apparent failure of state legislation to promote screening beyond the levels in other states without legislation, screening rates overall were higher than in most other countries, ranging from an average of 50.53% over five years to 60.02% over ten. Additionally, rates for endoscopy screening specifically were almost four times greater than those for FOBT testing, with around 50% of individuals on average reporting that they underwent either a sigmoidoscopy or colonoscopy exam in the past five years, which seems to alleviate the concern that endoscopy screening may be unaffordable without legislation mandating insurance coverage. In contrast to the results from the online survey, in which no significant gender differences in intentions to screen were observed, analyses in this study revealed that actual screening rates among men were on average significantly higher than women. This finding is consistent with the results of several previous studies, which have reported that men in the United States tend to exhibit higher

screening rates than women (Meissner, Breen, Klabunde & Vernon, 2006; Codori, Peterson, Miglioretti & Boyd, 2001).

One final note about state laws is that several states, including Arkansas (Senate Bill No. SB947, 2009), Illinois (Senate Bill No. SB 0270, 2009), and Kentucky (House Bill No. HB415, 2008) have recently proposed and passed legislation regarding the implementation of state-wide colorectal cancer screening programs that provide free access to screening tests, specifically among the uninsured. In Colorado, recent legislation has even begun to encourage insurance providers to incorporate incentives, including “premium discounts and reduced out-of-pocket costs for healthcare services” into their healthcare plans to promote uptake of preventive health behavior (House Bill No. HB09-1012, 2009).

Results from the state analyses thus failed to support all of the corresponding hypotheses; however, cross-cultural analyses of screening data significantly upheld both of the hypotheses that were tested. Although countries with screening programs, whether national or opportunistic, had higher screening rates than those without, the question that arose from this research was: why are screening rates outside the US still relatively low across the board?

One survey of 21 European countries conducted by Keighley and colleagues (2004) found that 75% of participants surveyed across countries expressed interest in FOBT screening if it were free. Still, screening rates across Europe remain very low, even among some countries with national programs. That there are varying degrees of public awareness as well as varying capacities among medical systems to handle demand for screening may contribute to the explanation for this apparent paradox (Kanavos & Schurer, 2007). Indeed, Loss, Eichhorn, and Nagel (2005), found gross lack of awareness among a Bavarian population; however, awareness of the screening tests was found to be 30% higher for this population than in US participants.

Additionally, the average waiting time for results of a colonoscopy has been found to vary by country but is generally long across most European countries, ranging from five days in Denmark, to one to three months in the UK (Kanavos & Schurer, 2007). This is especially disconcerting, as colonoscopy in the United Kingdom is offered as a follow-up to abnormal FOBT results, leaving patients awaiting answers regarding their health for weeks at a time. If the public is aware of this factor, it may influence decisions about screening behavior, despite the success the United Kingdom has seen in the early stages of the implementation of its national program. In Poland, purported financial difficulties in funding the program also may help to explain low screening participation levels there (Keighley et al., 2004). Meanwhile, Germany has extensive quality control measures for its gastroenterology services (Pox, Schmiegel & Classen, 2007), but the German population continues to exhibit surprisingly low screening uptake.

Some screening programs are subject to the same criticism as US legislation: namely—that screening tests remain subject to external costs, such as premiums and deductibles. In Japan, premiums for Employees' Health Insurance comprise roughly eight percent of one's income, though employers pay about half of this amount (Bennett, Weinberg, & Lieberman, 1998). Moreover, all medical services are subject to a ten percent co-payment (Bennett, Weinberg, & Lieberman, 1998). Yet these factors do not seem sufficient for completely explaining low screening rates, as the Japanese program is FOBT-based, which is inexpensive.

In Israel, which had the lowest screening rates of all the countries examined in this study, beliefs have been espoused that low colorectal cancer screening participation may be related to cultural factors, such as customs of modesty, religiosity, and fatalism among Arab populations. Indeed, Azaiza and Cohen (2008) did find higher levels of external health locus of control in Arab Israelis, potentially attributable to their beliefs that God plays a role in determining health. Cross-cultural differences in health beliefs, however, were also found across European nations,

with Finnish participants exhibiting the most resistance to talking about colorectal cancer symptoms (91%) and Icelandic participants expressing the least (39%) (Keighley et al., 2004). Given the high levels of participation in the Finnish national colorectal cancer screening program, this result seems paradoxical, as cultural inhibitions to talk about colorectal cancer symptoms do not seem to affect screening participation in that case. Interestingly, this study also revealed that Finnish participants exhibited the lowest level of awareness regarding colorectal cancer incidence, which is again surprising given their participation in screening programs.

An additional point of interest for future research is that, in the recently conducted “Eurobarometer Survey,” one item asked respondents in each country why they had undergone cancer screening. Results revealed that 10% of Austrians who had been screened did so because of a screening program according to self-report (European Commission, 2007b). In contrast, with the exception of Germany at three percent, only one to two percent of survey participants from all other EU countries attributed their screening participation to a screening program (European Commission 2007b). The stark contrast may be attributed to recent efforts to augment public awareness campaigns in Austria (Pox, Schmiegel & Classen, 2007). Yet the Czech Republic, which also has a national screening program, has also emphasized increasing public awareness of the program through intensive ad campaigns (Zavoral 2006; 2008) with much less success in boosting overall screening rates or in encouraging its people to receive screening as a result of the program. Only two percent of respondents from the Czech Republic reported that they received screening because of the national program (European Commission, 2007b).

This study had several limitations. First, only one rater coded legislation and screening programs. This was primarily done out of necessity due to the linguistic demands and time constraints required by the nature of the inquiry. However, the dimensions for which ratings were conducted were rather unambiguous. For example, there is little room for debate with

regard to whether a country has a screening program or does not or which kind of contingency construct is being employed within it. State laws were similar enough that they almost universally corresponded verbatim with one rating for each of the dimensions on which they were coded. To avoid error, sources from which ratings given to both state and national programs were drawn were reviewed several times and the coding was checked each time.

In seeking correlations between screening rates and state legislation, this study also makes two unsupported assumptions. First, though having insurance has been consistently correlated with greater participation in colorectal cancer screening (Zapka et al., 2002; Codori, Peterson, Miglioretti & Boyd, 2001; Bastani, Gallardi & Maxwell, 2001), this study presupposes that individuals are informed about their insurance plans and, specifically, coverage of colorectal cancer screening tests. While this may be the case for states in which laws require providers to inform their clients that screening tests for colorectal cancer are covered, this argument is weak, as it only refers to two states—Alaska and Arkansas—, neither of which had screening legislation in effect by the year in question (2006).

Secondly, it assumes that doctors are aware of coverage laws. With the sheer number of insurance providers in the US, it is impossible to expect that doctors' recommendations to undergo cancer screening would be influenced by whether screening is covered or not and much less by whether laws exist to mandate this coverage. Studies have found having a regular primary care provider is correlated with higher screening rates (Codori, Peterson, Miglioretti & Boyd, 2001; Meissner, Breen, Klabunde & Vernon, 2006), and doctors' recommendations specifically have been found to be one of the strongest predictors of subsequent screening behavior (Janz, Wren, Schottenfeld, & Guire, 2003; Azaiza & Cohen, 2008) at all stages of colorectal cancer screening adoption (Costanza et al., 2005). Thus, if PCP behavior is unlikely to change in

response to legislation that mandates insurance coverage, this may also explain why variations in such laws across states were not reflected in screening participation.

Cross-cultural analyses were specifically subject to the criticism that there was an over-reliance on FOBT data. This was true, in that the screening rates that were compared generally concerned only FOBT screening, except for Poland. For most countries, these rates were probably accurate representations of screening participation due to the reliance of national screening programs on that test. Still, the use of FOBT data may have underrepresented screening uptake, especially for the United States (with FOBT rates of 16.11% in comparison with 60% as the total screening rate), where endoscopy screening is significantly higher than is the use of FOBT. Yet results remained significant even when overall US and Swiss screening data were used and when outliers such as Uruguay, which achieved unusually high participation rates, were omitted from analyses.

A final limitation is that details of the screening situation in many countries, both in terms of participation rates and governmental action, were not assessed, in part due to language and data availability constraints. Ideally, future research would include a massive effort to compare all countries on many more dimensions than contained within the scope of this research. Especially important is further examination of cross-cultural issues, such as the observed differences in screening among minorities and ethnicities in many countries (Bastani, Gallardo & Maxwell, 2001; Janz et al., 2003; Natale-Pereira et al., 2008; National Health Service, 2003; 2006; Kanavos, Schurer, Owusu-Apenten & Sullivan, 2008; Azaiza & Cohen, 2008).

4.0 GENERAL DISCUSSION

Though relatively new to public policy for cancer screening, the use of contingency constructs in governmental interventions is growing on an international scale. Fifteen countries currently have either national or opportunistic screening programs in effect and many more, including Spain (Gutierrez-Ibarluzea, Asua & Latorre, 2008), Norway (Gutierrez-Ibarluzea, Asua & Latorre, 2008), Sweden (Blom, 2007), New Zealand (Ministry of Health, 2009), and Denmark (Gutierrez-Ibarluzea, Asua & Latorre, 2008), are conducting pilot studies with FOBT and colonoscopy follow-up. Additionally, sigmoidoscopy screening is being used in Italy (Kanavos, Schurer, Owusu-Apenten & Sullivan, 2008), and considered in Norway (Gutierrez-Ibarluzea, Asua & Latorre, 2008) and Sweden (Blom, 2007). Though they have adopted and implemented an FOBT/colonoscopy paradigm for their national program, the United Kingdom also conducted a trial on sigmoidoscopy and again found high levels of compliance (Atkin et al., 1998).

The crux of many of these programs lies in contingency, but only in the form of efficacy. Two countries, Germany and Japan, have responded to chronically low screening rates by incorporating disincentives and incentives, respectively, into their policies. Additionally, the state of Colorado has recently begun to encourage insurance providers to offer incentives to their clients, with the intention of further promoting preventive health behavior. Thus, these research studies collectively sought to investigate these government interventions and explain the

acceptance of and response to them by concomitantly seeking a more theoretically grounded understanding of contingency through empirical analysis of participants in the United States.

Although contingency has been shown to be effective in the short term for discrete behaviors (Kane et al., 2004), its effects in these studies remain inconclusive. Contingency-based messages engendered different effects in older and younger populations. In the undergraduate study, incentives were found to be more likely than disincentives to promote cancer screening behavior, whereas no significant effects were observed among participants over 50. Trends observed in the community sample studies even suggested that the opposite effects are true of contingency for such populations: that disincentives may prove to more effectively promote screening. Moreover, although relationships between contingency and regulatory focus were found in the first experiment, they were not replicated in the community sample studies. No significant correlations between contingency and risk perceptions were observed, either.

Some evidence was found in the first experiment to suggest that disincentives may promote perceptions of self-efficacy with regard to performing a screening behavior more effectively than incentives. Further study should explore these issues cross-culturally, especially with regard to the effects of incentives and disincentives on perceptions of self efficacy, as most interventions currently operate through the use of efficacy. If the use of incentives and disincentives impact those perceptions, the addition of these constructs to existing interventions, as in Germany, may influence the effectiveness of the intervention.

Finally, the use of efficacy itself was significantly predictive of increases in screening rates in international analyses. Yet just as no correlations were found between states with and without laws mandating insurance coverage, Medicare populations in the United States, for whom screening is covered subject to a deductible, have also not shown increases in screening rates as a result of this coverage, with participation remaining low among beneficiaries

(Engelman, Ellerbeck, Ahluwalia, Nazir & Velasco, 2001; Ko, Kreuter & Baldwin, 2002; Cooper & Kou, 2007).

Above all, these studies collectively replicate one of the primary conclusions on which the current literature on contingency is unified: effects of contingency are inconsistent (Kane et al., 2004; Shah et al., 1998). Although the most successful dependent measures in these studies were regulatory fit items, the results did not provide any clear conclusions about the nature and modus operandi of contingency. Age and gender differences were found, but relationships between contingency and message frame, regulatory focus, and risk perceptions were not consistently observed. Further insight into contingency may lie in the pursuit of several additional factors not examined in these studies.

First, the influence of contingency on continuing or maintenance behaviors is largely unsubstantiated in the research. In general, this presents a problem because, even if the initial adoption of the behavior is facilitated through the use of contingency, according to national guidelines, the maximum effectiveness of colorectal cancer screening as a preventative tool is achieved only through regular screening. Thus, if the conclusions of the previous research are replicated and supported with more precise theoretical justification, and contingency is found to be an effective tool for promoting individuals to perform a given behavior once, interventions may require additional elements to encourage behavior maintenance. If contingency is only influential in patients' decisions and considerations early in the behavior adoption process but not in decision-making subsequent to the initial performance of the behavior, colorectal cancer screening rates in countries with the aforementioned governmental interventions would be expected to demonstrate immediate upsurges after the interventions have taken effect. After a few years, however, these rates may drop again, and possibly even return to pre-intervention levels. Indeed, in the series of English pilot studies, this trend was observed, in that FOBT

participation decreased by about 10% between the first and second studies, which is not attributable to a changing subject pool, as the same participants in the same communities were used for both studies (National Health Service, 2003; 2006). This possibility presents serious implications for all current screening programs, whether they are national, opportunistic, regional, or state-based in nature. If screening rates peak upon the implementation of the program, only to fall thereafter, these programs will demonstrate initial success, but will be limited in their abilities to promote such preventive health behaviors in the long run. The longevity of the effectiveness of contingency is thus an integral component in the long-term success of these programs and merits further investigation.

Given the findings regarding efficacy in these studies, increasing efficacy over time may present a viable option for expanding and maintaining the success of these programs. Previous studies (Ore, Hagoel, Lavi & Rennert, 2001; Courtier et al., 2002), have demonstrated that, as the amount of efficacy provided in screening interventions increases, so does uptake. One study even presented a potential modification current screening programs modeled after the UK paradigm could make to account for attrition rates in participation should they be observed. Courtier and colleagues (2002) found that including personal interventions by a non-medical professional to personalize the screening process improves compliance even over formal invitations containing FOBT test kits. Pilot testing in Spain and the French national program indeed already incorporate such a personalized aspect. Even if efficacy could be increased over time, however, programs would eventually be unable to keep growing in this way to encourage continued screening. Thus, the success of contingency in promoting maintenance of preventive health behavior is a critically important object of inquiry for mass screening programs.

Another possible line of inquiry with regard to contingency and its effectiveness in encouraging maintenance behaviors would be the use of noneconomic-based factors that mirror

the use of economic incentives and disincentives in current programs. An example of such an intervention might be the use of time. For example, individuals who undergo screening could be given a priority or VIP status so that they would not have to wait at their doctor's offices when they come in for subsequent appointments (incentive). Conversely, individuals would be punished with longer waiting times if they fail to get screened (disincentive). Time is certainly a valuable commodity for individuals of all ages, and offering contingency with respect to eliminating or threatening to increase time constraints may be a powerful use of contingency in interventions. Additionally, if noneconomic incentives and disincentives were shown to be as effective as economic-based contingency, this would provide governments with a less expensive and therefore more feasible alternative for interventions or screening programs on a federal level than purely economic contingency-based programs.

Further study should also examine contingency in the context of the respective healthcare systems. Socioeconomic factors (Fukuda, Nakamura, Takano, Nakao & Imai, 2007; Eisinger et al., 2008; having insurance (Zapka et al., 2002; Codori, Peterson, Miglioretti & Boyd, 2001; Bastani, Gallardi & Maxwell, 2001), and barriers to screening as contextualized in the Health Behavior Model (Wardle et al., 2000) all do seem to be consistently correlated to screening participation across national boundaries. However, there are likely additional cross-cultural differences that may obfuscate any similarities and differences in screening behavior and in response to contingency observed between the countries of interest. For instance, although family history has been consistently correlated with higher screening rates in the US (Shah et al., 2007; Shah, Zhu, Palmer & Wu, 2007; Stark, Bertone-Johnson, Costanza & Stoddard, 2006), one survey reported a lack of awareness among Europeans that family history is even a risk factor for developing colorectal cancer, with an average of 54% of all participants surveyed across twenty-one European countries unaware of this fact (Keighley et al., 2004). Additionally, though gender

differences exist, men have been consistently reported as exhibiting higher screening rates than women in the US (Meissner, Breen, Klabunde & Vernon, 2006; Codori, Peterson, Miglioretti & Boyd, 2001), whereas women tend to exhibit higher screening rates than men outside the US (Kanavos, Schurer, Owusu-Apenten & Sullivan, 2008; Blom, 2007; Altenhofen, 2006; 2008; Felix Burda Stiftung, 2002).

These differences will likely be further complicated by the growing trend of immigration and multiculturalism, especially within the EU, as several studies in the US (Bastani, Gallardo & Maxwell, 2001; Janz et al., 2003; Natale-Pereira et al., 2008), England (National Health Service, 2003; 2006), Australia (Kanavos, Schurer, Owusu-Apenten & Sullivan, 2008), Israel (Azaiza & Cohen, 2008), and Germany (Heisel et al., n.d.; Kanavos, Schurer, Owusu-Apenten & Sullivan, 2008) have demonstrated differential participation in preventive cancer screening among minorities. Such disparities have been attributed not only to the generally lower socioeconomic status (SES) observed for minorities (Natale-Pereira et al., 2008), but also to cultural differences between ethnicities (Szczepura et al., 2006; Azaiza & Cohen, 2008) and an inability to translate the pro-con ratio of screening (decisional balance) to immigrants in the context of the culture and language of the host country (Otero-Sabogal, Stewart, Shema & Pasick, 2007). Efforts are underway in Germany (Kanavos, Schurer, Owusu-Apenten & Sullivan, 2008) and the United States to encourage colorectal cancer screening in particular among minorities through Turkish and Spanish advertisement campaigns, respectively. For example, in the United States, the Centers for Disease Control and Prevention have begun to incorporate Spanish advertisements into their “Screen for Life” program (CDC, 2009). Unfortunately, the participant base in these studies was not diverse enough to examine these issues further; however, future studies would clearly be well-served to focus on the role contingency might play in facilitating this communication or potentially even hindering it. Specifically, the relationship between

contingency and decisional balance would be a very interesting and promising avenue for additional research.

One general problem, however, is that all of these studies relied on self-report in terms of participation in preventive health behaviors, including sunscreen use and colorectal cancer screening. Self-reporting of colorectal cancer screening behavior, however, has been found to be accurate (Baier et al., 2000). A second problem is that presenting contingency in the context of gain- and loss-framed messages necessitated that questionnaires assumed a primarily hypothetical nature. Most studies in the body of gain- and loss-framed message literature, however, have adopted and accepted this construct as a valid measure for examining responses to variously framed messages (Rothman, Bartels, Wlaschin & Salovey, 2006) and one study also found that expressed interest in hypothetical screening situations was predictive of later colorectal cancer screening behavior (Wardle et al., 2000).

Given that colorectal cancer is the second leading cause of cancer-related death in the Western world and results in an estimated national expenditure for colorectal cancer treatment at \$5.5-\$6.5 billion per year in the US alone (Campbell, Coates & Chattopadhyay, 2006), the importance of increasing colorectal cancer screening rates among at-risk populations is incontrovertible. From a fiscal standpoint, early colorectal cancer treatment is estimated to cost on average \$30,000 per patient, whereas the average per patient cost of late treatment skyrockets to \$120,000 (Arnst, 2007; Burke, 2007). Yet if polyps can be detected before they are allowed to develop into cancer, the patient avoids both early and late cancer treatment costs, in addition to the reduced quality of life that is not included in the aforementioned estimates but often accompanies the process of cancer treatment. Furthermore, when colorectal cancer is diagnosed in its earliest stages, the five-year survival rate for patients is greater than 90%; however, the prognosis for survival decreases to only about 10% when it is diagnosed in its late stages (ACS,

2006c). Widespread screening has, therefore, been predicted to reduce colorectal cancer mortality by 15% to 60%, depending upon the type and comprehensiveness of the screening test considered in the calculations (Campbell et al., 2006). Thus, attention must be directed to contingency research and finding the most effective means for encouraging colorectal cancer screening, as it not only saves money for the patient, insurance providers, and the government, but also—most importantly—it saves countless lives.

APPENDIX A

EXPERIMENT 1 CONTINGENCY MESSAGES

Incentive X gain/loss X prevention

The University of Pittsburgh is always changing the fees that students are charged. Every year, all students at the University of Pittsburgh pay a flat Student Health fee amounting to \$130. This fee is included in tuition. For next year, one possible change that the University Administration is considering is altering this policy based on students' health behavior. One of the new considerations is the use of sunscreen. If you [do not] use sunscreen regularly, you can apply for and receive [will not be eligible for] a \$30 reduction on this fee, which would decrease your yearly tuition costs to \$100.

Incentive X gain/loss X detection

The University of Pittsburgh is always changing the fees that students are charged. Every year, all students at the University of Pittsburgh pay a flat Student Health fee amounting to \$130. This fee is included in tuition. For next year, one possible change that the University Administration is considering is altering this policy based on students' health behavior. One of the new considerations is an annual skin cancer screening exam with a university dermatologist. If you [fail to] see the dermatologist annually for a skin cancer screening exam, you can [cannot] apply

for and receive a \$30 reduction on this fee, which would decrease your yearly tuition costs to \$100.

Disincentive X gain/loss X prevention

The University of Pittsburgh is always changing the fees that students are charged. Every year, all students at the University of Pittsburgh pay a flat Student Health fee amounting to \$130. This fee is included in tuition. For next year, one possible change that the University Administration is considering is altering this policy based on students' health behavior. One of the new considerations is the use of sunscreen. If you [fail to] use sunscreen regularly, you can avoid [may be charged] a \$30 increase in this fee, which would increase your yearly tuition costs to \$160.

Disincentive X gain/loss X detection

The University of Pittsburgh is always changing the fees that students are charged. Every year, all students at the University of Pittsburgh pay a flat Student Health fee amounting to \$130. This fee is included in tuition. For next year, one possible change that the University Administration is considering is altering this policy based on students' health behavior. One of the new considerations is an annual skin cancer screening exam with a university dermatologist. If you [fail to] see the dermatologist annually for a skin cancer screening exam, you can consequently avoid [be charged] the \$30 increase in this fee, which would increase your yearly tuition costs to \$160.

Information-only X gain X prevention

The use of sunscreen has been shown to dramatically decrease risk for skin cancer. This is because sunscreen is the most effective way of preventing skin cancer, which is the most common cause of cancer related deaths in the US.

Information-only X loss X prevention

The use of sunscreen has been shown to dramatically decrease mortality from skin cancer. This is because using sunscreen is the most effective way to protect already damaged skin cells from developing into skin cancer.

Information-only X gain X detection

An annual skin cancer screening exam with a dermatologist is the most effective way of removing precancerous cells and thereby preventing skin cancer from developing, which is the most common cause of cancer related deaths in the US.

Information-only X loss X detection

An annual skin cancer screening exam with a dermatologist is the most effective way of detecting skin cancer, which is the most common cause of cancer related deaths in the US, and treating it early.

APPENDIX B

BASELINE QUESTIONNAIRE FOR EXPERIMENT 2

1. What do you think are your actual chances of getting colorectal cancer in your lifetime?
Would you say
 - a) Extremely unlikely
 - b) Very unlikely
 - c) Somewhat unlikely
 - d) Neither likely nor unlikely
 - e) Somewhat likely
 - f) Very likely
 - g) Extremely likely
 - h) Don't know
2. If your doctor or health plan told you that they would pay you to get a colorectal cancer screening test, what is the minimum amount they would have to pay you to go in and get a colorectal cancer screening test sometime in the next two weeks?
 - a) I would have to be paid \$_____ to get screened in the next two weeks.
3. Do you have any kind of healthcare coverage, including health insurance, prepaid plans such as HMOs, or government plans such as Medicare?
IF YES:
 - a) Do you have Medicaid/Medicare?
 - i. Yes
 - ii. No
 - b) Do you have any other type of insurance?
 - i. Yes
 - ii. No
 - c) How good do you think that your insurance is in covering your costs for colorectal cancer screening tests?
 - i. Very good
 - ii. Good
 - iii. Bad

- iv. Very bad
 - v. Don't know
 - d) How good do you think that your insurance is in covering your costs for colorectal cancer treatment?
 - i. Very good
 - ii. Good
 - iii. Bad
 - iv. Very bad
 - v. Don't know
4. Indicate your level of agreement/disagreement with this statement: the government should be more involved than they are now in making colorectal cancer screening easier to get.
- a) Strongly disagree
 - b) Disagree
 - c) Agree
 - d) Strongly agree
 - e) No opinion
5. Would you support a law that required all insurance companies in the state to cover colorectal cancer screening?
- a) Yes
 - b) No
6. Now, I'm going to read you a list of organizations. Before being contacted for this study, had you ever heard of:
- a) ...the National Institutes of Health?
 - i. Yes
 - ii. No
 - b) ...the American Cancer Society?
 - i. Yes
 - ii. No
 - c) ...the Cancer Information Service?
 - i. Yes
 - ii. No
 - d) ...the National Cancer Institute?
 - i. Yes
 - ii. No
 - e) ...the 1-800-4-Cancer information number?
 - i. Yes
 - ii. No
 - f) ...the United States Center for Cancer Prevention Research?
 - i. Yes
 - ii. No

7. How effective do you think such government-funded agencies are in promoting public health by informing and educating the public about cancer and cancer screening through PSA's or commercials sponsored by any of the groups just listed, websites, pamphlets, brochures, etc.?
- a) Very effective
 - b) Effective
 - c) Ineffective
 - d) Very ineffective
 - e) Don't know

APPENDIX C

LAB SESSION QUESTIONNAIRE FOR EXPERIMENT 2

- 1) If your doctor or health plan told you that they would pay you to get a colorectal cancer screening test, what is the minimum amount they would have to pay you to go in and get a colorectal cancer screening test sometime in the next two weeks?
 1. I would have to be paid \$_____ to get screened in the next two weeks.

For the next few questions, you will be given various scenarios. Remembering your risk information you received during this session, please answer the corresponding questions.

2) (LOSS-FRAMED/DISINCENTIVE SCREENING QUESTION)

For the next question, suppose you had insurance that covered cancer screening, with a monthly payment (premium) of \$280. However, your insurance payments are based upon whether or not you are screened regularly for colorectal cancer as recommended by your doctor now. If you do not get screened now, your monthly premiums will increase and your monthly insurance payments would be higher.

How much of an increase in your monthly payments would this insurance plan have to propose for you to get screened for CRC now?

1. Less than \$10 per month
2. \$10 per month
3. \$20 per month
4. \$50 per month
5. \$75 per month
6. \$100 per month
7. Greater than \$100 per month

8. I would not get screened.

3) (LOSS-FRAMED/DISINCENTIVE TREATMENT QUESTION)

For the next question, suppose again that you had insurance that covered cancer screening, with a monthly payment (premium) of \$280. However, your insurance payments are based upon whether or not you were screened regularly for colorectal cancer as recommended by your doctor now, but in a different way. This time, if you did not get screened now AND later developed colorectal cancer, your monthly premiums would increase and your monthly insurance payments would be higher after you were diagnosed with cancer.

How much of an increase in your monthly payments would this insurance plan have to propose for you to get screened for CRC now?

1. Less than \$10 per month
2. \$10 per month
3. \$20 per month
4. \$50 per month
5. \$75 per month
6. \$100 per month
7. Greater than \$100 per month
8. I would not get screened.

4) (GAIN-FRAMED/INCENTIVE SCREENING QUESTION)

For the next question, suppose you had insurance that covered cancer screening, with a monthly payment (premium) of \$280. However, your insurance payments are based upon whether or not you are screened regularly for colorectal cancer as recommended by your doctor now. If you get screened now, your monthly premiums would decrease, and your monthly insurance payments would be lower.

How much of a decrease in your monthly payments would this insurance plan have to propose for you to get screened for CRC now?

1. Less than \$10 per month
2. \$10 per month
3. \$20 per month
4. \$50 per month
5. \$75 per month

6. \$100 per month
7. Greater than \$100 per month
8. I would not get screened.

5) (GAIN-FRAMED/INCENTIVE TREATMENT QUESTION)

For the next question, suppose again that you had insurance that covered cancer screening, with a monthly payment (premium) of \$280. However, your insurance payments are based upon whether or not you were screened regularly for colorectal cancer as recommended by your doctor now, but in a different way. This time, if (and only if) you did get screened now, you would be eligible for lower payments on cancer treatment if you developed cancer in the future.

The average total cost of treatment for colorectal cancer that is detected early is \$30,000. Say your insurance covered \$8,000 regardless of whether or not you had been screened, making your co-pay \$2,000 a month for one year if you developed cancer. But if you get screened prior to being diagnosed with cancer, you will pay less. Which reduced price would your insurance plan have to offer instead of the standard co-pay of \$2000 in order for you to get screened now?

1. \$1900 co-pay per month on future cancer treatment
2. \$1500 co-pay per month on future cancer treatment
3. \$1000 co-pay per month on future cancer treatment
4. \$500 co-pay per month on future cancer treatment
5. \$100 co-pay per month on future cancer treatment
6. I would not get screened.

APPENDIX D

QUESTIONNAIRES FOR STUDY 3

1) Do you have any kind of healthcare coverage?

1. Yes
2. No
- Prefer not to answer

2) How comprehensive do you think your insurance is at covering preventive cancer screening?

1. Very good
2. Good
3. Bad
4. Very bad
- Don't know

3) How comprehensive do you think your insurance is at covering cancer costs?

1. Very good
2. Good
3. Bad
4. Very bad
- Don't know

4) How effective do you think your government is at covering preventive cancer screening?

1. Very good
2. Good
3. Bad
4. Very bad
- Don't know

5) How effective do you think your government is at covering cancer costs?

1. Very good
2. Good
3. Bad
4. Very bad
- Don't know

[ARTICLE on colorectal cancer and screening]

For the next few questions, you will be given various scenarios. Remembering your risk information you received during this session, please answer the corresponding questions.

For the next question, think of your monthly insurance payment (premium). Now suppose that this insurance covered cancer screening. However, your insurance payments are based upon whether or not you are screened regularly for colorectal cancer as recommended by your doctor now. If you do not get screened now, your monthly premiums will increase and your monthly insurance payments would be higher.

- 6) How much of an increase in your monthly payment would this insurance plan have to propose for you to get screened for CRC now?
1. Less than 1%
 2. 5 % per month
 3. 10% per month
 4. 25% per month
 5. 50% per month
 6. 75% per month
 7. 100% (your payments would double)
 8. Greater than 100% (your payments would more than double)
 9. I would not get screened.

For the next question, suppose again that you had insurance that covered cancer screening, and think of your current monthly payment (premium). Now, your insurance payments are based upon whether or not you were screened regularly for colorectal cancer as recommended by your doctor now, but in a different way. This time, if you did not get screened

now AND later developed colorectal cancer, your monthly premiums would increase and your monthly insurance payments would be higher after you were diagnosed with cancer.

- 7) How much of an increase in your monthly payments would this insurance plan have to propose for you to get screened for CRC now?
1. Less than 1%
 2. 5 % per month
 3. 10% per month
 4. 25% per month
 5. 50% per month
 6. 75% per month
 7. 100% (your payments would double)
 8. Greater than 100% (your payments would more than double)
 9. I would not get screened.

For the next question, suppose you had insurance that covered cancer screening. Think of your current monthly payments (premium). However, imagine that your insurance payments are based upon whether or not you are screened regularly for colorectal cancer as recommended by your doctor. If you get screened now, your monthly premiums would decrease, and your monthly insurance payments would be lower.

- 8) How much of a decrease in your monthly payments would this insurance plan have to propose for you to get screened for CRC now?
1. Less than 1%
 2. 5 % per month
 3. 10% per month
 4. 25% per month
 5. 50% per month
 6. 75% per month
 7. 100% (your payments would double)
 8. Greater than 100% (your payments would more than double)
 9. I would not get screened.

For the next question, suppose that you had insurance that covered cancer screening and think of your current monthly payment. However, your insurance payments are based upon whether or not you were screened regularly for colorectal cancer as recommended by your doctor

now, but in a different way. This time, if (and only if) you did get screened now, you would be eligible for lower payments on cancer treatment if you developed cancer in the future.

- 9) The average total cost of treatment for colorectal cancer that is detected early is \$30,000 per year in the US (10,000£ per year in the United Kingdom).^{*} Imagine your insurance covered some of the cost from whatever figure applies to you (\$30000 if you are in the United States, 10,000£ if you are in the UK) regardless of whether or not you had been screened. After this insurance coverage, your co-pay each month would be 6% of the total cost per year if you developed cancer. But if you get screened prior to being diagnosed with cancer, you will pay less. Which reduced price would your insurance plan have to offer instead of the standard co-pay of 6% in order for you to get screened now?
1. 5% co-pay per month on future cancer treatment
 2. 4% co-pay per month on future cancer treatment
 3. 3% co-pay per month on future cancer treatment
 4. 2% co-pay per month on future cancer treatment
 5. 1% co-pay per month on future cancer treatment
 6. I would not get screened.

^{*}Numbers are real figures.

APPENDIX E

STATE RATING SCALE

Financial Efficacy

1	2	3	4	5
No costs covered	Some tests covered, only with co-payment	All tests covered, subject to co-payments	All tests covered, limited co-payments	All costs of all tests are covered

Comprehensiveness of Cancer Prevention

1	2	3	4	5
No test covered	Fixed amount is covered without reference to type or frequencies of test	Tests covered, but guidelines are vague	Tests covered, with reference to or at least some tests covered according to ACS guidelines	All tests covered according to ACS guidelines

Mandate Comprehensiveness

0	1	2	3	4	5
No mandate for any insurance plans	Required offering	Medicaid only	Some health insurance plans	Most health insurance plans	All health insurance plans

Population Targeting

1	2	3	4	5
No one covered	Symptomatic individuals	High risk individuals and symptomatic	50 and older, and high risk not according to ACS definition	Everyone as defined by ACS is addressed

Choice efficacy

1	2	3	4	5
No choice of test		Doctor chooses test		Individual (or individual and doctor) chooses test

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